DOCUMENT RESUME

ED 161 201 EC 112 336

TITLE	Research, Development and Demonstration Center in Education of Handicapped Children. Final Report.
INSTITUTION	Minnesota Univ., Minneapolis. Research, Development, and Demonstration Center in Education of Handicapped Children.
SPONS AGENCY	Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.
PUB DATE	Jul 77
NOTE	138p.; Print may be faint on some pages due to poor quality of print in the original
EDRS PRICE	MF-$0.83 HC-$7.35 Plus Postage.
DESCRIPTORS	*Demonstration Programs; *Handicapped Children; *Program Descriptions; *Research and Development Centers
IDENTIFIERS	Final Reports

ABSTRACT

The final report summarizes activities over an 8-year period of a research, development and demonstration center for the education of handicapped children. An introductory section focuses on the history and administrative organization of the program. Brief summaries of 23 projects follow, with information on purpose, history, research activities and findings, and educational products. An annotated listing of products (including educational materials and guidelines, center publications, and major presentations) is provided, along with descriptions of related research activities, training, and personnel involved in the center. (CL)

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FINAL REPORT

UNIVERSITY OF MINNESOTA

Research, Development and Demonstration Center in Education of Handicapped Children

July, 1977

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INTRODUCTION

This document is a final report of the activities and accomplishments of the University of Minnesota's Research, Development and Demonstration Center in Education of Handicapped Children from its inception in 1969 to its termination in 1977. During its eight years of funding by the Department of Health, Education and Welfare, U. S. Office of Education, Bureau of Education for the Handicapped, numerous activities were sponsored by the Center. This report is a brief summary of the activities and the resultant educational products and findings. Detailed information may be found in funding proposals, annual reports, and Center reports.

HISTORY

The University of Minnesota's Research, Development and Demonstration Center in Education of Handicapped Children was first funded in 1969. The focus of the Center at that time was based upon an Aptitude X Treatment interaction model, with sixteen investigators involved in three areas of programmatic research (Aptitude studies; Aptitude X Treatment studies; Development, Demonstration and Dissemination activities). Between its inception in 1969 and the summer of 1971, only minor changes occurred in the Center's research activities.

In the summer of 1971, a major reorganization of the Center took place. At this time, the Center identified the improvement of language and communication abilities of handicapped children from birth to age nine as its long-term objective. In 1972, the Center received funding for 13 investigators involved in two areas of programmatic activities:

Program Area I - Development and evaluation of early communication intervention systems for handicapped children

Program Area II - Improving the academic performance of handicapped children by training in the use of cognitively based language skills

Table 1 presents the progression of Center activities from 1969 to 1971 (the year in which the first continuation proposal was submitted to Washington) and to 1972 (the year in which a major Center reorganization was initiated).

Table 1

Center Activities from 1969 to 1972

1969 PROPOSAL	1971 PROPOSAL	1972 PROPOSAL
Bruininks, Gallistel, & Rydell - Studies related to the acquisition of early reading skills among retarded children from educationally disadvantaged backgrounds. (AXT)		
Spudore, Grismer, & Bruininks - A cooperative resource center for educable mentally retarded children: A development and demonstration proposal. (DD)		
Turnure - Development of techniques for assuring young handicapped children's attentional involvement in early educational activities. (AXT)		
Wilderson - Adjustment, performance and achievement in disturbed and delinquent children under various forms of psychoeducational intervention. (AXT)		
Bruininks - Cross modal perception related to the reading performance of educable mentally retarded children. (A)	Bruininks & Clark - Perceptual aptitudes related to the development of early reading skills under different instructional approaches. (AXT)	
Feldman - Biosocial and cognitive characteristics of handicapped children which may interact with treatment variables. (A)	Feldman & Bart - Patterns and sequences of cognitive development. (A)	
Martin - Modification of speech fluency in children. (DD)	Martin & Ingham - Modification of speech fluency in children. (DD)	
Siegel - Interpersonal communication skills and treatment of mentally retarded (AXT)	Siegel - Language retardation. (A, AXT)	
Turnure - A developmental investigation of the effects of extraneous visual and auditory stimulation on the orienting behavior of normal and retarded children. (A)	Turnure - A developmental investigation of the effects of extraneous visual and auditory stimulation on the orienting behavior of normal and retarded children. (A)	
Wood - Curriculum reorganization. (DD)	Dunn - Development and evaluation of a model teacher education program in special education. (DD)	
	Bruininks & Spudore - Efficacy of three organizational approaches to providing educational services to educable mentally retarded children. (AXT)	
	Tamplin - Language functioning of adolescent deaf students. (A)	
	Spudore & Horrobin - Educational stimulation of Down's Syndrome infants. (AXT)	Spudore & Horrobin - Enhancement of communication skill development in Down's Syndrome (Mongoloid) children through early intervention. Project I-1.
	Moores - Evaluation of preschool intervention programs for very young deaf children. (AXT)	Moores & McIntyre - Evaluation of effects of preschool programs on the development of communication skills in the deaf. Project I-1.
	Moores - Development of morphological structures in deaf children with deaf parents. (A)	Moores & Hoffmeister - Development of morphological structure of deaf children of deaf parents. Project I-1.
		Moores, Clark, & Woodcock - Development of receptive communication in deaf children from 2 1/2 to 5 1/2 using rebus and sign language. Project I-1.
		Tamplin - Early identification of children with potential communication handicaps. Project I-1.
	Turnure - Effects of syntactic mediation on the acquisition and reversal of paired-associates by normal and retarded children. (AXT)	Turnure - The development of verbal elaboration skills in the young mentally retarded child. Project II-1.
	Gallistel - Choice of reading and spelling methods for children who have severe difficulty learning.	Gallistel - Improving the measurement and teaching of reading skills in children with learning disabilities. Project II-1.
		Samuels - A mastery based experimental program for teaching mentally retarded children word recognition and reading comprehension skills through use of hypothesis/test procedures. Project II-1.
	Taylor - Research and development of strategies to increase the efficacy of cognitive processes of educable mentally retarded children.	Taylor, Vinsonhaler, & Turnure - The development of strategies for the young retarded child's reception and organization of communications. Project II-1.
		Yamish - Reading improvement through training in verbal self-instruction. Project II-1.

Beginning in 1972, the focus of the Center was the creation of intervention strategies and materials which develop and improve language communication skills in handicapped children from birth to age nine. During this period, 15 different projects were funded. The projects are described below.

Rynders & Horrobin - Enhancement of communication skill development in Down's Syndrome (Mongoloid) children through early intervention.

Initial activities related to this project were first funded in 1969. In 1972, the project was funded as Project I-1, a project in Program Area I. Following a mid-year reorganization in 1973, the project was designated, under the same title, as Project I-1A. This new title alluded to the collaborative relationships between the project and Project I-1B (Charlesworth). The project continued through July 1977.

Charlesworth (Kreutzer, Kjergaard) - Verbal and non-verbal communication in tool-using situations.

This project was first funded in 1973 as Project I-6. Under its new designation as Project I-1B (following mid-year reorganization in 1973), the project was continued through August 1975.

Moores (McIntyre, Weiss, Goodwin) - Evaluation of effects of preschool programs on the development of communication skills in the deaf.

This project began in 1969. It was designated as Project I-2 in 1972 and continued through July 1977, with the redesignation as Project I-2A made in 1973 to indicate its collaborative efforts with three other projects concerned with education of the deaf (Projects I-2B, I-2C, and I-2D).

Moores (Best, Roberts) - Cognitive development in young deaf children.

This project was first proposed for funding in 1974 as Project I-2B, and was completed in the same year.

Moores (Hoffmeister, Best, Ellenberger) - Development of morphological structures of deaf children of deaf parents.

This project was first proposed in 1971 and continued through July 1977. First designated as Project I-3 in 1972, the project later became I-2C to indicate its closeness with the other projects related to deafness.

Clark & Moores (Woodcock) - MELDS (Minnesota Early Language Development Sequence) development of receptive communication in deaf children from 2 1/2 to 3 1/2 using rebus and sign language.

This project was initiated in 1972 as Project I-4. The project was redesignated as Project I-2D in 1973 and continued as such through August 1975.

Templin - Early identification of children with potential communication handicaps.

This project was first proposed in 1972 as Project I-5. Following reorganization in 1973, the project continued as Project I-3 through December 1974.

Turnure (Thurlow, Buium, Seshadri) - The development of verbal elaboration skills in the young mentally retarded child.

Growing out of studies first funded in 1971, this project was proposed as Project II-1, a project in Program Area I, in 1972. The project continued through July 1977.

Gallistel - Improving the measurement and teaching of coding skills in children with learning disabilities.

First initiated in 1971 under the title "Choice of reading and spelling methods for children who have severe difficulty learning," this project was funded and completed in 1972 as Project II-2.

Riegel (Donnelly) - The assessment and training of young educationally handicapped children in the use of systematic strategies for organizing and remembering.

This project grew out of Project II-4 as proposed in 1972. The specific activities of this project were first proposed in 1973, when the project was designated as Project II-2. The project was completed in June 1974.

Samuels (Archwamety, Mueller) - A mastery-based experimental program for teaching mentally retarded children word recognition and reading comprehension skills through use of hypothesis/test procedures.

This project was initiated in 1972 as Project II-3. With the addition of new and related projects by Samuels in 1974, this project was redesignated as Project II-3B. The project continued through July 1977.

Samuels (Terry) - Accuracy and speed (automaticity) of word recognition and their relationship to comprehension in mental retardates.

This project was initiated as Project II-3A in 1974 and ended August 1975.

Samuels (Dahl) - Facilitating reading speed and comprehension by means of repeated reading of the same passages.

This project was initiated and completed in 1974 as Project II-3C.

Taylor (Turnure, Thurlow, Krus, Wiseman) - Project for developing vocabulary concepts in EMR children.

Growing out of research on strategies for increasing the efficiency of cognitive processes in educable mentally retarded children (1971), this project was funded as a part of Project II-4 in 1972. The vocabulary aspects of the project became the only activities proposed as Project II-4 in 1973. Funding continued through August 1975.

Wozniak & Egeland - Reading improvement through training in verbal self-instruction and efficient information processing.

This project began in 1972 and continued as Project II-5 through July 1977.

In addition to these projects, which comprised Program Areas I and II, a supportive program was initiated in 1972. The purpose of this program was to provide the Center with a measurement consultative service.

Figure 1 summarizes all projects funded through the Research,

Development and Demonstration Center in Education of Handicapped Children , and the duration of funding for each project.

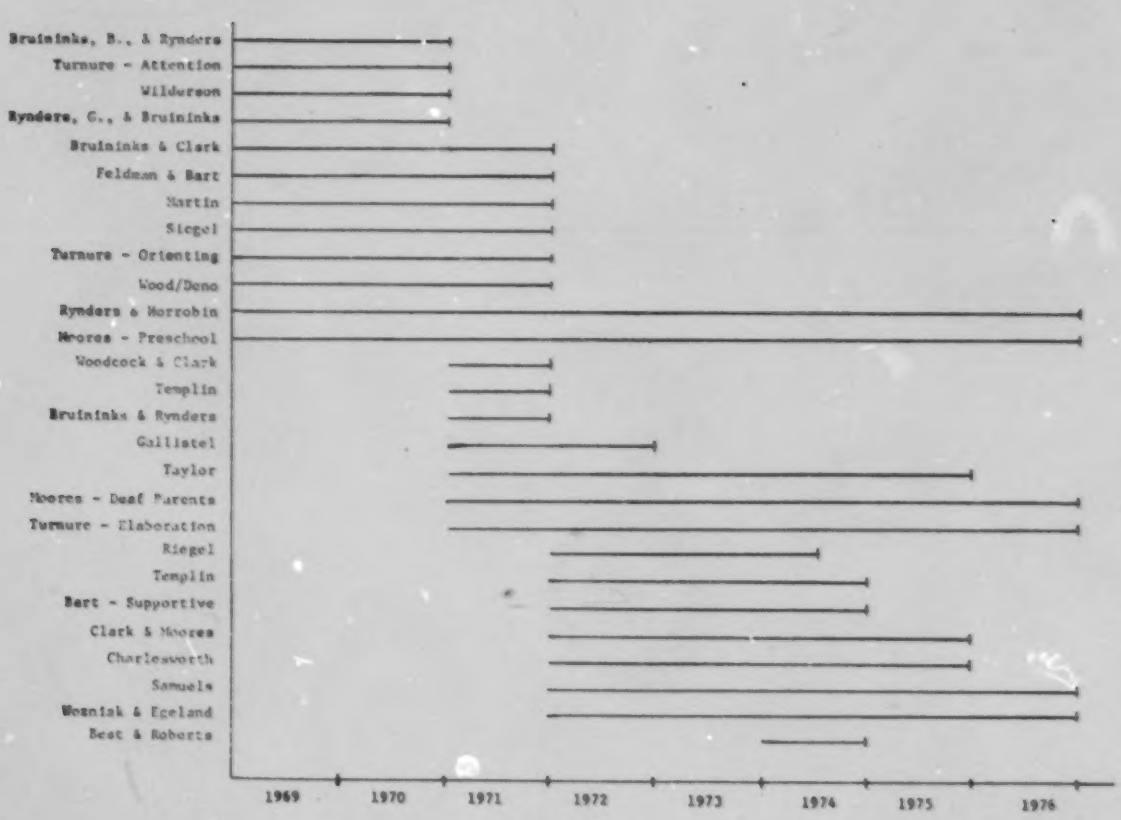


Figure 1

Projects Funded Through Center from 1969 to 1976

ADMINSITRATIVE ORGANIZATION

The major responsibility for the functioning of the Center lay with the Director, who was the point of articulation between the Projects and Program Research Branch of the Bureau of Education for the Handicapped and the University of Minnesota. The organizational chart of the College of Education is presented in Figure 2. The Administrative Organization of the Center, presented in Figure 3, illustrates the Center's relationship both to the University of Minnesota and the Bureau of Education for the Handicapped.

Center Director. The Director represented the Center within and without the Center. He was responsible to the Chairperson of the Department of Psychoeducational Studies. The Director functioned as a facilitator of research and as a catalyst to the research activities of the Center.

The Director was responsible for preparing the periodic reports for the U. S. Office of Education and for such university reports as were required. He performed any other functions not specifically designated to another group or individual and retained the contractural responsibilities of the Center.

The Director was responsible under the terms of the grant for supervising the work of the Center to assure that the terms of all contracts were met. He implemented the Center's policies and guidelines relating to program, personnel, and budget:

1) by allocating personnel and funds consistent with federal policies and the policies of the University of Minnesota.

Figure 2

COLLEGE OF EDUCATION
UNIVERSITY OF MINNESOTA

ORGANIZATIONAL CHART
SEPTEMBER 15, 1976

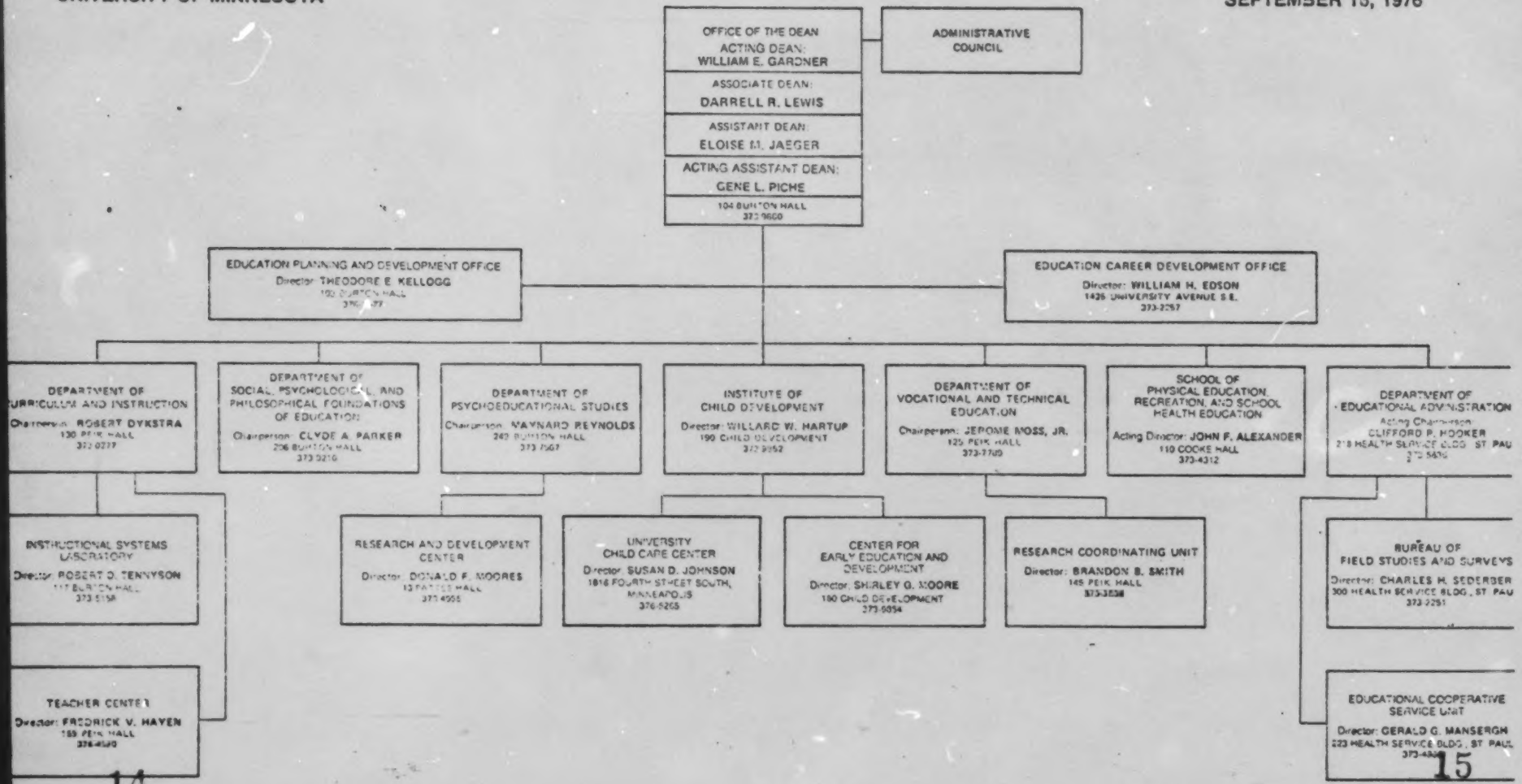
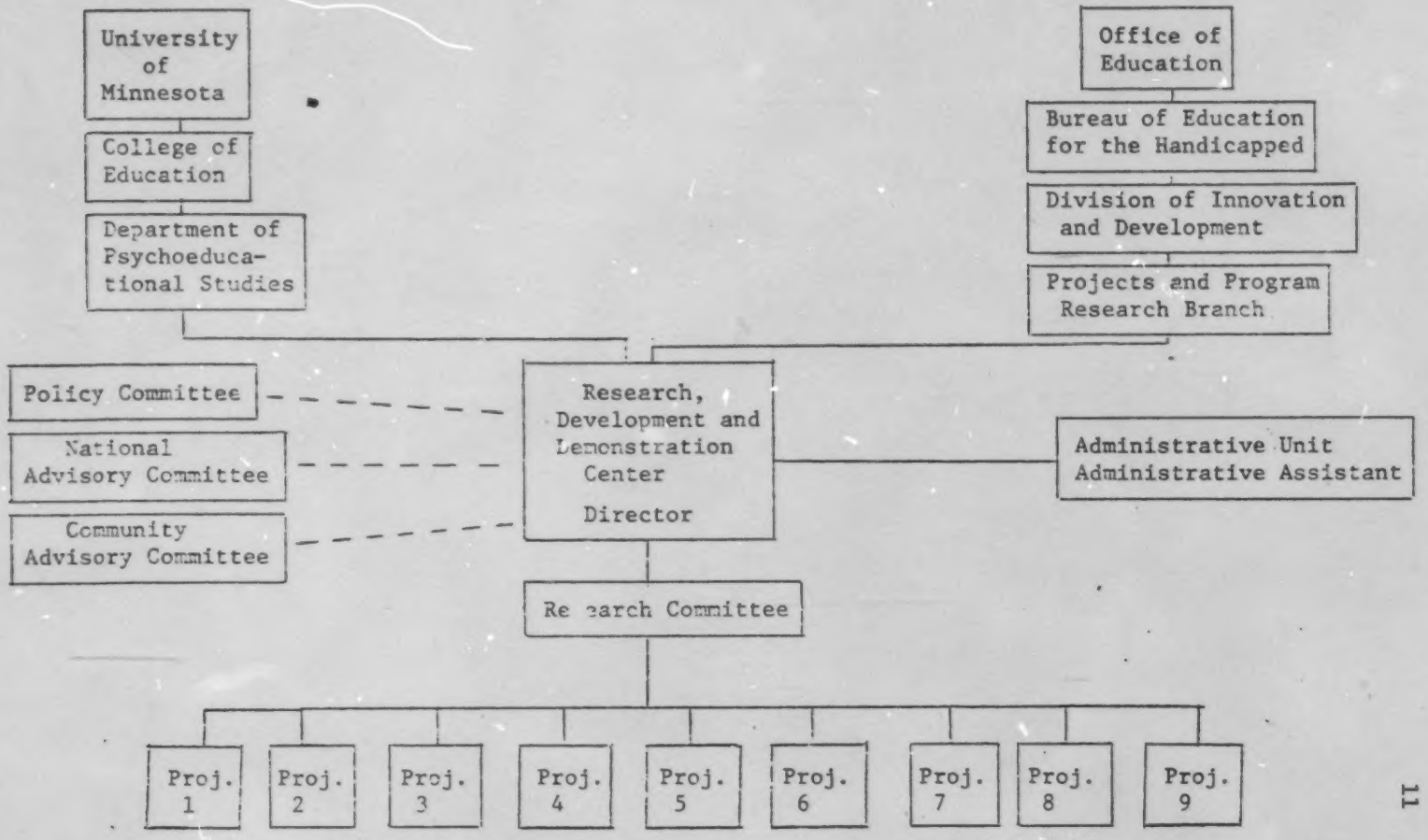


Figure 3

Administrative Organization
University of Minnesota
Research, Development and Demonstration Center in Education of Handicapped Children



Policy Committee. The Policy Committee consisted of the College Dean for Research and Development, Chairman of the Department of Psychoeducational Studies who served as chairman of the committee, the Center Director who acted as executive secretary, the Associate Directors, and two "at-large" members from outside the College of Education. The members of the Policy Committee were appointed by the Chairman of the Department of Psychoeducational Studies in consultation with the Center Director.

The Policy Committee was responsible for formulating objectives of the Center, for establishing general policies and programs consistent with those objectives, for the establishment of general priorities for Center activities and Center resources and for reviewing the general progress of the Center programs.

Research Committee. The Research Committee was comprised of the Center Director as Committee Chairman, and four researchers elected by the Center Staff. Terms were staggered so that each year there were two continuing members and two new members in addition to the Center Director.

The Research Committee functioned to advise the Center Director in making decisions regarding all major commitments of Center resources. This committee:

a) assured that project requests for Center funds are given proper evaluation and review and recommends the specific disposition of all such requests.

b) ensured that all supported projects are appropriately monitored.

c) advised on the program of seminars and research training conducted by the Center.

d) approved the award of all Center fellowships.

The Research Committee:

a) held meetings as needed to accomplish its duties.

b) followed an agenda prepared by the Director, and appropriate supporting documentation.

c) kept minutes of its meetings which are distributed to the Center personnel.

Project Director. Each Project Director, in addition to assuming responsibility for conducting individual projects, made a contribution to programmatic planning and to the development of the Center. Each Director participated in several Center and program area meetings, submitted progress reports, contributed to sections of the renewal requests, provided the Administrative Assistant information on expenditures, and served on elected committees.

Principal Secretary. The Principal Secretary was responsible for carrying out duties assigned by the Director and arranged for the performance of all secretarial services for the Institute. Among the duties assigned to Principal Secretary were: 1) Maintenance of all budget records, including the preparation of monthly budget statements for the Director, 2) Preparation of all personnel documents, including all changes and additions that occur during the year, 3) Preparation and processing of all federal forms pertaining to the grant (e.g., proposals, quarterly reports, staff summaries), 4) Production of all technical reports, including the supervision and typing of all

technical reports from rough drafts, correction of grammar, spelling and punctuation, and the final assembly and binding of all reports, 5) Recording of minutes and proceedings at all meetings and conferences, and 6) Responsibility for all correspondence, including letters of inquiry and acknowledgment. The Principal Secretary was responsible for supervising and training all clerical employees, arranged for overload clerical help, and kept all records for the Director.

Decision Making Procedures

Evaluation of Proposed Projects. The sequence by which proposed projects were evaluated is illustrated in Figure 4. Proposals followed a standard format. The proposal was first submitted to the Research Committee. It was reviewed by the Research Committee with reference to the criteria of a) quality, b) applicability to education of young handicapped children, c) extent of emphasis on programmatic solutions to problems, and d) congruence with the Institute's program of research. The Committee recommended either rejection, acceptance, or provisional acceptance contingent on specified modification of the proposed activity.

Proposals rejected or given provisional acceptance were a) revised or b) the decision appealed, in person as well as in written form. Revised proposals, as well as accepted proposals, were reviewed by the Research Committee using the same criteria as used in initial evaluation; in addition, consideration was given to overall Center objectives and focus and to the cost effectiveness of the activity. All revisions had to be acceptable to the Research Committee before approval was recommended to the Director, who made the final decision.

Figure 5

Monitoring Procedures for Individual Projects

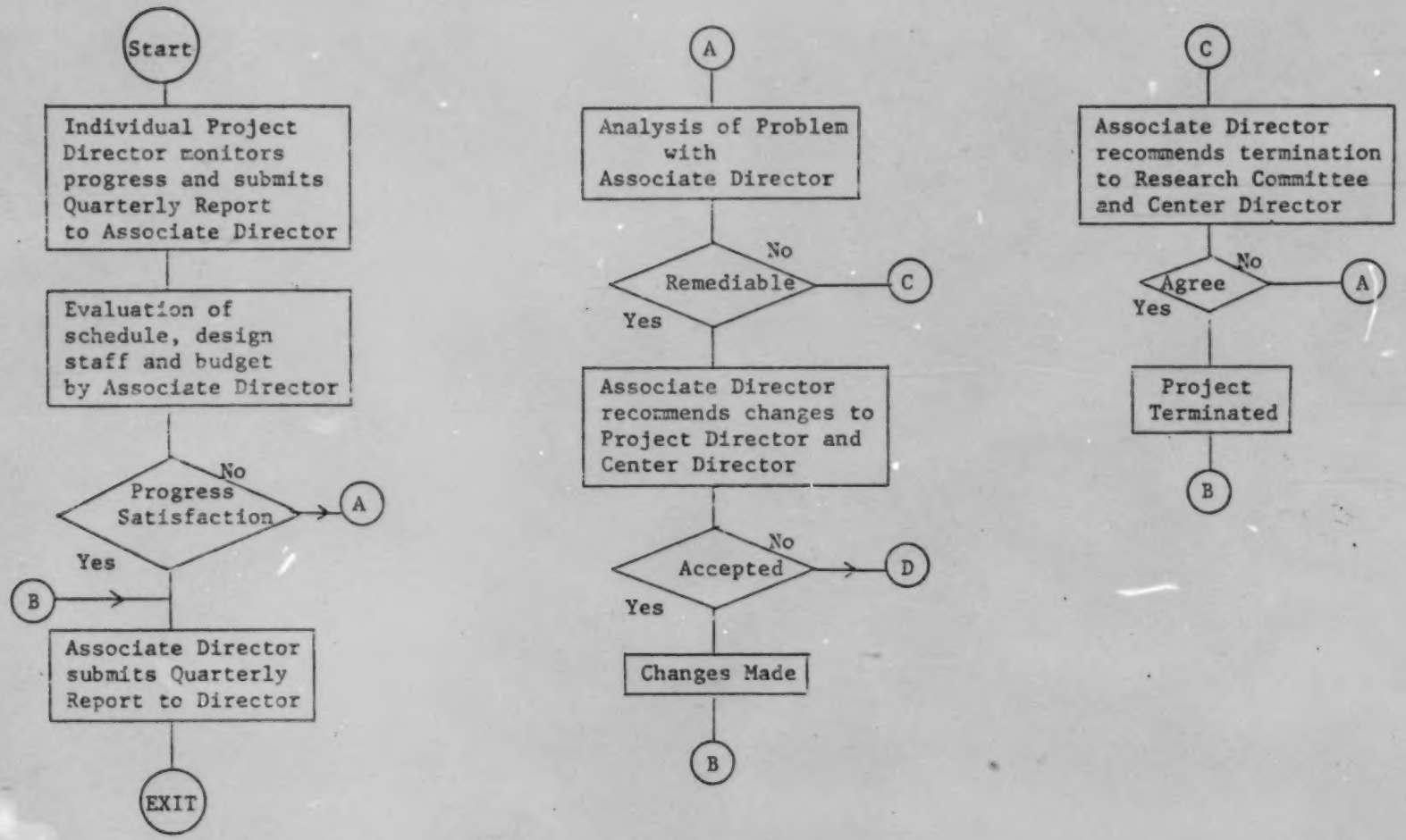


Figure 6

Evaluation Procedures for Continuation Requests

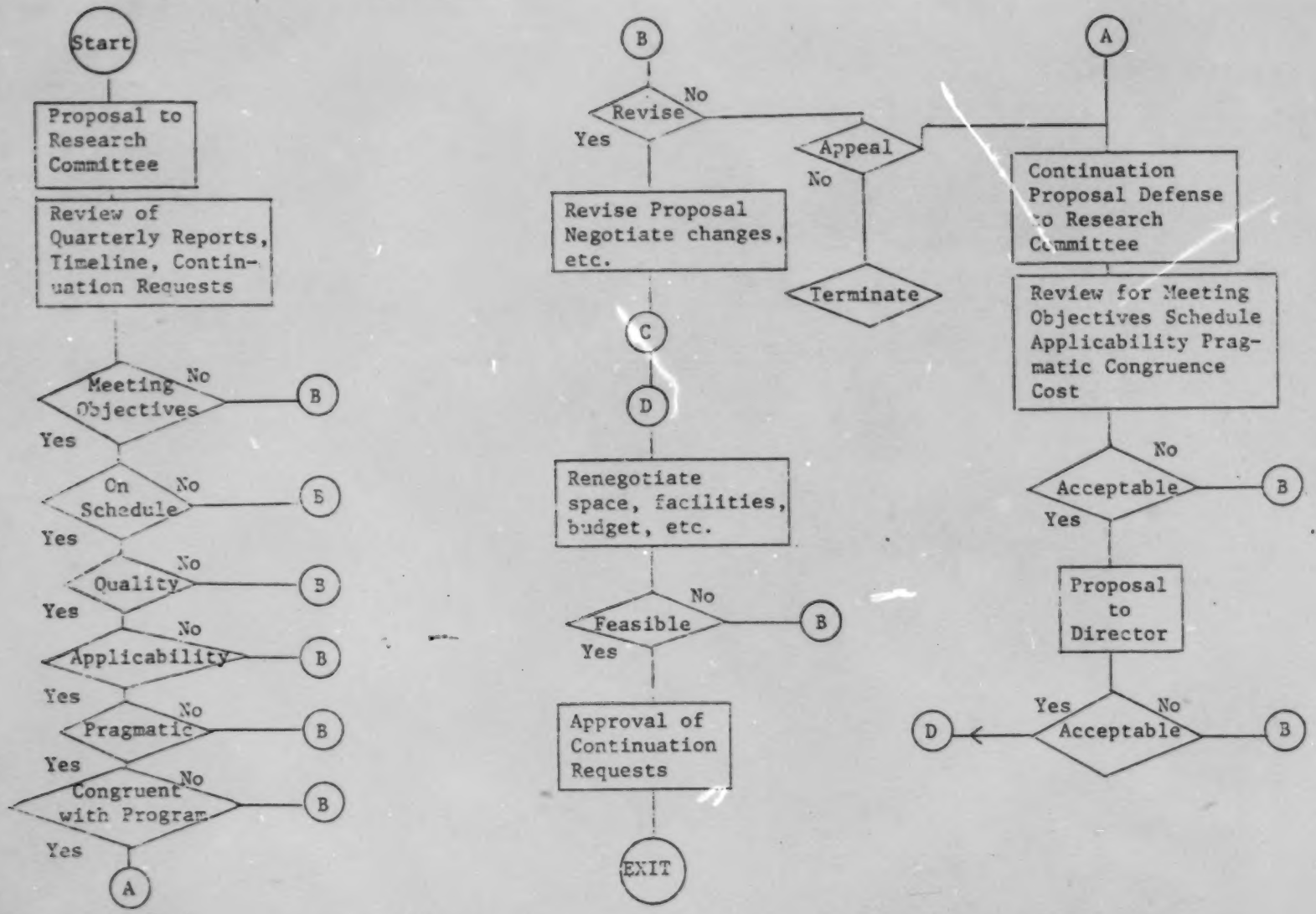


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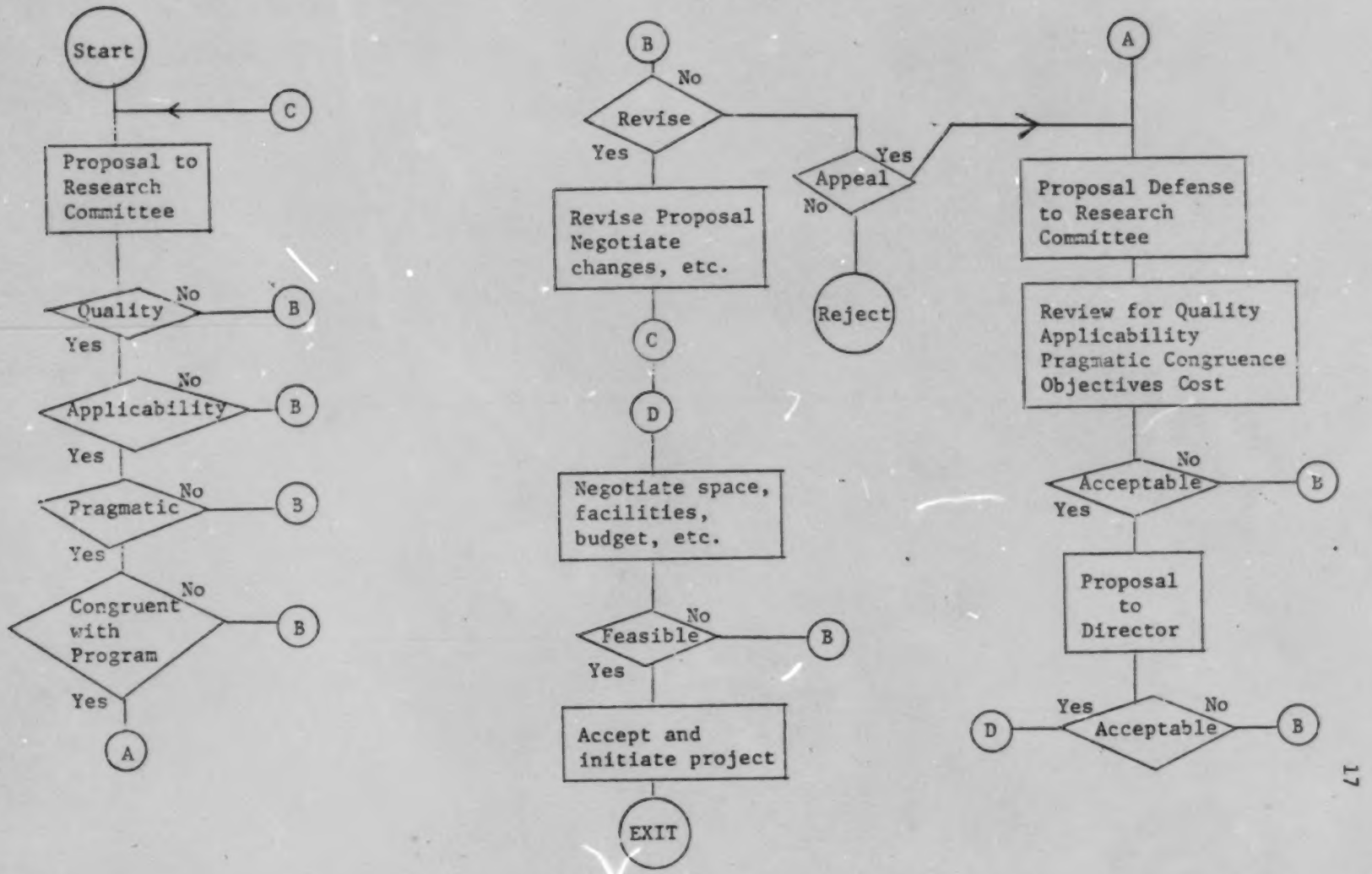
Figure 4

Evaluation Procedures for Projects



Monitoring of Activities. The monitoring of projects, shown in Figure 5, was the joint responsibility of the Project Director and the Center Director. All Project Directors were required to develop time lines by which their progress would be monitored. If a project was not progressing on schedule, the discrepancy was brought to the attention of the Center Director who worked on the problem with the Project Director. In addition to the individually developed time lines, progress reports for all projects were submitted quarterly. Difficulties encountered were worked on cooperatively by the Project Director and Center Director until the situation was remedied.

Continuation of Existing Projects. Evaluation procedures for continuation requests are presented in Figure 6. The sequence of evaluation was similar to that for evaluating proposed projects in year one, with additional consideration given to the success of the project in meeting its objectives and progressing on schedule during the period of funding. The continuation request followed the same format as new proposals and also included a progress report summarizing the results of the project and progress realized in relation to research objectives.

ACCOMPLISHMENTS AND EDUCATIONAL PRODUCTS

The culmination of any activity in the Center was viewed as the development of products that could be used to enhance the education of handicapped children. Such products included a variety of materials, ranging from reports of research relevant to the classroom, to guidelines to be used by educators, to actual classroom materials.

Not only have products been developed by individual projects within the Research, Development and Demonstration Center, but also several educational products have been produced as a result of the combined efforts of Center investigators. For example, courses have been offered within the University of Minnesota. One such course was designed for Center personnel to promote discussion of research techniques and methods for product development (SpEd 5-302: Conducting Research and Training Programs with Handicapped Children). Another course, an extension course entitled "Language Acquisition for the Handicapped," presented the work of the Center to teachers from public school systems. On a broader level, the Center conducted a one-day MASE (Minnesota Association of Special Educators) symposium in April, 1973. The sumposium was designed to strengthen ties between Center researchers and state administrators of special education, to provide administrators with a background on the scope of Center activities, and to receive feedback on Center projects. The Center also presented a symposium at the American Psychological Association Annual Convention in Montreal in August, 1973. This symposium explored

approaches to conducting educationally relevant research.

The activities of the Center have been reported in educational journals at various times during the Center's existence. The following articles were particularly helpful in increasing the visibility of the Center to the educational community:

From the R & D Centers: Research leading to classroom techniques. Education and Training of the Mentally Retarded, 1972, 7, 107-112.

Intervention programs, instructional packages, field-tested curricula, facilities design, and more. A look at what's happening in special education R & D. Education and Training of the Mentally Retarded, 1974, 9, 98-106.

Where the action is: A look at four special education R and D centers. Exceptional Children, 1975, 41, 419-425.

Most educational products coming out of the Center have been associated with specific projects. The next subsection of this report summarizes the general findings of all projects that have been funded through the Research, Development and Demonstration Center (beginning with those in existence during the last five years, 1972 - 1977), and lists the educational products (instructional materials, book, journal articles, Center reports) developed by each. Following this, products are presented topically (e.g., Educational Materials, books, etc.) across projects.

Individual Projects

Enhancement of Communication Skill Development in Down's Syndrome Children Through Early Intervention

(Rynders and Horrobin)

Purpose: To maximize communication abilities in Down's syndrome children through early intervention (parent tutoring and preschool experience).

History: The project was funded initially in 1969 as an investigation of "high-risk" and "at-risk" infants. In 1972, the project was identified as Project I-1, a project in Program Area I. In 1973, the project's designation as Project I-1A alluded to the collaborative relationships between the project and Project I-1B (Charlesworth, Verbal and non-verbal communication in tool-using situations). The project terminated August 1976.

Research Activities and Findings: Initial activities of the project represented an attempt to explore the feasibility of a special education treatment program to be carried out by the parents of a Down's syndrome infant at home during the child's first three years of life without threatening the integrity of the family constellation. The program consisted of a special curriculum, a stimulus feedback program, and educative support through weekly training sessions. Down's syndrome children in the Twin Cities and Chicago were selected to serve as experimentals and controls. Measures of expressive and receptive communication, intellectual motor as well as family process characteristics, were among the data collected during the project.

Results showed superior communication and cognitive skills for children in the program, compared to the control group at the time all children were 36 months old. At that time experimental children entered an experimental preschool program provided by the project.

Numerous substudies were conducted by the project. For example, regarding the maternal linguistic environment, one study showed that Down's syndrome children were exposed to a higher number of utterances, yet a lower mean length of utterance, a higher number of sentences, yet a lower mean length of sentence, and a higher frequency of grammatically incomplete sentences, imperative sentences, and single word responses. A second, companion study showed that young Down's syndrome children develop the basic semantic relational concepts of the English language and correct basic English syntax if given an adequate linguistic environment, though the development of

these parameters is delayed as compated to the normal child.

Efficacy data, based on measures of experimental and control children at the age of five-years, remain to be fully analyzed. A final report on these data will be prepared.

Educational Products

Instructional Materials

Curriculum materials for Down's syndrome infants.

Books and Contributions to Books

To give an EDGE: A guide for new parents of Down's syndrome (mongoloid) children. Minneapolis: Colwell Press, 1974.

Project EDGE: The University of Minnesota's communication stimulation program for Down's syndrome infants. In B. Friedlander, G. Sterritt, & G. Kirk (Eds.), Exceptional infant (Vol. 3). New York: Brunner/Mazel, 1975.

Three basic considerations in utilizing mothers as tutors of their very young retarded or potentially retarded children. In L. Morreau (Ed.), Strategies for the design of parent training programs: Intellectual stimulation and motivation of young children. Minneapolis: Central Midwest Regional Educational Laboratory, in press.

Journal Articles and Published Proceedings

Preferences in institutionalized severely retarded children for selected visual stimulus material presented as operant reinforcement. American Journal of Mental Deficiency, 1972, 76, 568-573.

Effectiveness of manual guidance, modeling and trial and error learning procedures on the acquisition of new behaviors. Merrill-Palmer Quarterly of Behavior and Development, 1973, 19, 49-65.

Early maternal linguistic environment of normal and non-normal language-learning children. Proceedings, 81st Annual Convention, American Psychological Association, 1973.

Early maternal linguistic environment of normal and non-normal language-learning children. American Journal of Mental Deficiency, 1974, 79, 52-58.

Project EDGE: A longitudinal study of communication skill development in young home-reared Down's syndrome children. Proceedings, 50th Annual Convention, National Association for Retarded Citizens, 1974, in press.

A semantic-relational concepts based theory of language acquisition as applied to Down's syndrome (mongoloid) children: Implications for a language enhancement program. Journal of Speech and Hearing Disorders, in press.

Center Reports

Effectiveness of manual guidance, modeling and trial and error learning for inducing instrumental behavior in institutionalized retardates. Research Report #4. June 1970.

Industrial arts for elementary mentally retarded children: An attempt to redefine and clarify goals. Occasional Paper #3. January 1971.

A mobile unit for delivering educational services to Down's syndrome (mongoloid) infants. Research Report #30. January 1972.

Two basic considerations in utilizing mothers as tutors of their very young retarded or potentially retarded children. Occasional Paper #12. January 1973.

The early maternal linguistic environment of normal and Down's syndrome (mongoloid) language learning children. Research Report #51. May 1973.

The severe nature of verbal learning deficits in preschool Down's syndrome (mongoloid) children. Research Report #60. August 1974.

A semantic-relational-concept based theory of language acquisition as applied to Down's syndrome children: Implications for a language enhancement program. Research Report #62. May 1974.

Maternal speech to normal and Down's Syndrome children matched for mean length of utterance. Research Report #98. April 1976.

Patterns of Communication in Social and Problem Solving Behavior in Retarded Children

(Charlesworth)

Purpose: To identify communication patterns of mentally retarded children associated with failure to adapt to problem situations.

History: The project was initiated in 1973 as a project in Program Area I entitled "Verbal and non-verbal communication in tool-using situations." The revised title was adopted in 1975. The project terminated August 1975.

Research Activities and Findings: Initial research activities involved the expansion of work on tool-using in normal preschool children to children with learning handicaps. In 1973, the focus of the project became the identification of those communication patterns in mentally retarded children that are associated with failure to adapt to problem situations. Data from a Help-Seeking study indicated that, in terms of number of words, the verbal output of high-risk children was significantly less than that of normal children of the same sex and age. Furthermore, high-risk children who were trained to seek help in tasks showed a higher verbal output, including requests for help, than those high-risk children who were not trained.

A schema for use in naturalistic observations of problem-solving and communication behavior was developed by project personnel to enable the project to conduct field observations of Down's Syndrome and normal children. Observations were carried out in the homes of Down's Syndrome children and normal children for approximately 30 hours over a ten day period at three intervals.

Educational Products

Books and Contributions to Books

Facial expressions of infants and children. In P. Ekman (Ed.), Darwin and facial expression: A century in review. New York: Academic Press, 1973.

Human intelligence as adaptation: An ethological approach. In L. Resnick (Ed.), The nature of intelligence. Pittsburgh: Lawrence Relbaum Associates, in press.

Journal Articles and Published Proceedings

Ethnology: A new invasion. Contemporary Psychology, 1973, 18, 106-107.

An ethological approach to observation in learning settings. Proceedings of the Conference on "Systematic observation in school settings" sponsored by the Dept. of Special Education, University of Minnesota, U.S.O.E., May 1974.

Center Reports

Communication during problem solving in high-risk and normal preschool children. Occasional Paper #33. May 1975.

A method for studying adaptive behavior in life situations: A study of everyday problem solving in a normal and Down's syndrome child. Development Report #6. October 1976.

Evaluation of Effectiveness of Preschool Programs on the Development of Communication Skills in the Deaf

(Moores, Weiss and Goodwin)

Purpose: To evaluate several preschool programs for hearing impaired children.

History: The project was initiated in 1969 and gathered data from preschools across the country over a five year period from 1969 to 1974. The project was a part of Program Area I and terminated August 1976.

Research Activities and Findings: The project conducted a five-year evaluation of seven preschool programs for the deaf. The programs represented a variety of methodological approaches and philosophies of education. Each year, several assessment instruments, some of which were developed within the project, were administered in the fall and in the spring. The data were reported each year and disseminated widely. Rather than identifying one "best" approach to preschool education for the deaf child, the project has identified those variables predictive of success. Among the recommendations coming out of the project were the need for greater attention to academic subjects in the preschool curriculum, greater exposure of the deaf preschooler to deaf adult models, and the use of manual means of communication as well as oral communication in order to increase the avenues of input to the preschool child.

Educational Products

Books and Contributions to Books

Education of children with hearing handicaps. In J. Irwin & M. Marge (Eds.), Principles of childhood language disabilities. New York: Appleton-Century-Crofts, 1972.

Early childhood special education for the hearing handicapped. In H. Spicker, R. Hodges, & N. Anastasiow (Eds.), Early education for the handicapped. Minneapolis: University of Minnesota Press, 1975.

Educating the Deaf: Psychology, Principles and Practices. Boston: Houghton Mifflin, 1977 (in press).

Review of research in education of the deaf. In L. Mann & D. Sabatino (Ed.), Third review of special education. New York: Grune & Stratton, in press.

Journal Articles and Published Proceedings

Evaluation of preschool programs. Proceedings of the Conference of Executives of American Instructors of the Deaf, St. Augustine, Florida, 1970.

Diagnostic pedagogy: Evaluation of educational outcomes (Keynote address). Proceedings of the International Congress of Deafness, Stockholm, Sweden, 1970, Volume 2, 164-168.

Gestures, signs, and speech in the evaluation of programs of hearing impaired children. Sign Language Studies, 1973, 2, 9-28.

Receptive communication of deaf children across five modes. Exceptional Children, 1973, 40, 22-28.

A long-term evaluation of infant and preschool programs for the hearing impaired. Minnesota Speech and Hearing Association Journal, in press.

Center Reports

Evaluation of preschool programs: An interaction analysis model. Occasional Paper #1. April 1970.

Education of the deaf in the United States. Occasional Paper #2. November 1970.

Neo-oralism and the education of the deaf in the Soviet Union. Occasional Paper #5. February 1971.

Recent research on manual communication. Occasional Paper #7. April 1971.

Evaluation of programs for hearing impaired children: Progress report 1970-1971. Research Report #27. December 1971.

Evaluation of programs for hearing impaired children: Report of 1971-1972. Research Report #39. September 1972.

Early childhood special education for the hearing impaired. Occasional Paper #13. February 1973.

Evaluation of programs for hearing impaired children: Report of 1972-1973. Research Report #57. December 1973.

Evaluation of programs for hearing impaired children: Report of 1973-1974. Research Report #81. December 1974.

Characteristics of young deaf children and early intervention programs. Research Report #91. August 1975.

Recommended policies and procedures: Preschool programs for hearing impaired children. Research Report #104. November 1976.

Cognitive Development in Young Deaf Children

(Best and Roberts)

Purpose: To examine the relationship between the young deaf child's communication skills and his cognitive development.

History: The project was first proposed for funding in 1974 as Project I-2B, a project in Program Area I. The project was completed December 1974.

Research Activities and Findings: The project administered several tests of cognitive development, environmental stimulation, and communication development in order to examine the relationship between the deaf child's communication skills and his cognitive development.

Educational Products

Center Reports

Classificatory development in deaf children: Research on language and cognitive development. Occasional Paper #15. April 1973.

Cognitive development in young deaf children. Research Report #92. August 1975.

Development of Morphological Structures in Deaf Children of Deaf Parents

(Moores, Hoffmeister, Best, Ellenberger)

Purpose: To investigate the effectiveness of various visual communication systems used in the education of deaf children, especially the effects of American Sign Language on language acquisition and communication abilities.

History: This project was first proposed and funded in 1971. First designated as Project I-3 of Program Area I in 1972, the project later became I-2C to indicate its closeness with the other projects related to deafness. The project continued through August 1976.

Research Activities and Findings: The project's research activities focused upon the examination of processes and procedures through which children primarily exposed to American Sign Language develop their linguistic abilities. The project made extensive videotapes of the development of ten deaf children of deaf parents. Films were transcribed, categorized, and analyzed according to various theoretical systems.

Data suggested that the children were following quite closely the developmental norms of children with normal hearing. There was no evidence that a primary language in the visual motor mode altered any aspect of the development and use of language systems. There was evidence, however, that the nature of the communication system was different enough from the auditory temporal mode as to affect the type of communication at early stages (e.g., more reliance on verbs). The project also developed three tests of imitation for use, and employed several of the instruments used by the preschool project (Evaluation of Effectiveness of Preschool Programs on the Development of Communication Skills in the Deaf). Several reports on the use of various parts of speech, the effects of manual communication on early manual communication, utilization of residual hearing, the development of vocal communication skills, and the performance in speechreading have been prepared.

Educational Products

Books and Contributions to Books

Families and deafness. In D. Reed (Ed.), Deafness annual. Washington, D.C.: Social and Rehabilitation Services, 1973.

Nonvocal systems of verbal behavior. In R. Schiefelbusch & L. Lloyd (Eds.), Language perspectives - acquisition, retardation and intervention. Baltimore: University Park Press, 1974.

Educating the Deaf: Psychology, Principles and Practices. Boston: Houghton Mifflin, 1977 (in press).

Review of research in education of the deaf. In L. Mann & D. Sabatino (Eds.), Third review of special education. New York: Grune & Stratton, in press.

Journal Articles and Published Proceedings

The development of manual communication in mentally retarded deaf individuals. Journal of Rehabilitation for the Deaf, 1972, 6, 19-26.

Some procedural guidelines for the study of the acquisition of sign language. Sign Language Studies, 1975, 7, 121-137.

The development of sign language in deaf children of deaf parents. Minnesota Journal of Speech and Hearing, in press.

The growth of linguistic abilities in deaf children of deaf parents. Journal of Minnesota Speech and Hearing Association, in press.

Center Reports

Communication - some unanswered questions and some unquestioned answers. Occasional Paper #10. July 1972.

The acquisition of specific reference in the linguistic system of a deaf child of deaf parents. Research Report #53. August 1973.

The acquisition of sign language in deaf children of deaf parents: Progress report. Research Report #65. June 1974.

The parameters of sign language defined: Translation and definition rules. Research Report #83. January 1975.

Early stages in the acquisition of negation by a deaf child of deaf parents. Research Report #94. August 1975.

The modal auxiliary systems of American Sign Language and English. Research Report #96. August 1975.

The pronoun system of American Sign Language: A consideration of modality and linguistic factors. Research Report #106. April 1977.

MELDS (Minnesota Early Language Development Sequence) Development of Receptive Communication in Deaf Children from 2 1/2 to 3 1/2 Using Rebus and Sign Language

(Clark, Moores, and Woodcock)

Purpose: To develop a program of structured lessons for use by teachers and parents to facilitate the development of language skills in young hearing impaired children who have little or no language.

History: The project was first funded in 1972 as a project concerned with the development of receptive communication in young deaf children using rebus and sign language. Starting as Project I-4 in Program Area I, it was re-identified as Project I-2D in 1974 to indicate its relationship to other projects concerned with deafness. The project terminated August 1975.

Research Activities and Findings: Initial activities of the project focused on the development of 100 lessons for parents and 100 lessons for teachers of young deaf children. The lessons were designed to teach language using signs and rebuses. On the basis of feedback from field-testing, the lessons were revised. Distal field-testing was conducted in Georgia and Wisconsin, and confirmed the effectiveness of the lessons. A reference glossary of 99 pages of signs and rebuses was also produced by the project. The language program was used by Project I-1 (Enhancement of Communication Skill Development in Down's Syndrome Children Through Early Intervention) during 1973. The final MELDS program contained 112 parent lessons and 112 teacher lessons, and is being disseminated by the Center.

Educational Products

Instructional Materials

MELDS: Classroom Kit. Development Kit #1. August 1975.

MELDS: Parent Kit. Development Kit #2. August 1975.

Books and Chapters in Books

Graphic systems of communication. In L. L. Lloyd (Ed.), Communication assessment and intervention strategies. Baltimore: University Park Press, 1976.

Journal Articles and Published Proceedings

A beginning reading program for young deaf children. Journal of the Minnesota Speech and Hearing Association, 1975, 14, 27-32.

Center Reports

MELDS (Minnesota Early Language Development Sequence) glossary of rebuses and signs. Occasional Paper #18. June 1973.

A comparative study of young children's ease of learning words represented in the graphic systems of Rebus, Bliss, Carrier-Peak, and traditional orthography. Research Report #107. May 1977.

Early Identification of Children with Potential Communication Handicaps

(Templin)

Purpose: To identify, as early as possible, potentially speech-handicapped children, to explore predictors of later articulation, academic, and social deficiencies, and to describe the longitudinal development of articulation.

History: The project was initiated in 1972 as Project I-5, a part of Program Area I. The project was retitled as Project I-3 after reorganization of Program Area I in 1973. The project terminated December 1974.

Research Activities and Findings: Using data collected from approximately 400 children over a period from pre-kindergarten to eleventh grade, the project has analyzed measures of academic achievement, oral and graphic expressive and receptive communication, and personality in order to determine significant factors that identify children who will be speech, language, and/or academically handicapped in later grades.

Educational Products

Books and Chapters in Books

Developmental aspects of articulation. In W. D. Wolfe & D. J. Goulding (Eds.), Articulation and learning. Springfield, Ill.: Charles C. Thomas, 1973.

Center Reports

A longitudinal study of the correlations of predictive measures obtained in prekindergarten and first grade with achievement measures obtained through eleventh grade. Research Report #101. October 1976.

A longitudinal study of achievement scores obtained by subjects with predictive scores more than one standard deviation above or below the mean. Research Report #103. November 1976.

Development of the production of consonants classified by position in a word, manner of articulation and place of articulation. Research Report #105. December 1976.

The Development of Verbal Elaboration Skills in the Young Mentally Retarded Child

(Turnure, Thurlow, Buium, Seshadri)

Purpose: To investigate verbal elaboration skills in young mentally retarded children and to devise procedures for fostering the development of efficient verbal elaboration skills within these children.

History: The project was first funded in 1971 as a project to investigate the effects of syntactic mediation on the acquisition and reversal of paired-associates by normal and retarded children. With the reorganization of the Center in 1972, the project was identified as Project II-1, a part of Program Area II. The project terminated August 1976.

Research Activities and Findings: Research activities in the project have focused upon exploring the facilitative effects of "syntactic mediation" or "elaboration" on the learning of retarded children. Initial research findings demonstrated that (a) retarded children acquire paired-associates virtually immediately when the pairs are embedded within a verbal context (i.e., elaboration), (b) elaborations facilitate backward associations as well as forward associations, (c) learning increases with more extended contexts, (d) extended contexts are very facilitative even in extremely difficult tasks (up to 24 paired-associates), and (e) extended elaborations promote transfer of training, a finding at variance with previous research not employing extended elaborations.

Further investigation into the elaborative characteristics of effective communications revealed that structural characteristics (e.g., compound sentence, complex sentence, paragraph) were less important than relational characteristics. Investigations of relational elaborations indicated that nonsense relations resulted in very poor performance levels, and further that positional-unfamiliar relations were also ineffective for retarded children, suggesting that the use of such relations should be avoided in learning situations. The project also found that while a question format which did not allow for an answer was extremely detrimental to retarded children, well-formed interrogatives were able to engender spontaneous verbal elaboration in retarded children. The interrogatives were found to be more effective than experimenter-provided sentences. The questioning format was further found to promote retention of learned materials, up to 30 days after original learning, when the child was prompted with a complete visual cue during the retention test. In fact, the retention level of retarded children under such conditions was equal to that of gifted children.

The project also conducted an extensive program of observation and collection of language samples in the classroom in order to identify the elaborations used by teachers.

Educational Products

Journal Articles and Published Proceedings

Extended verbal mediation in the learning and reversal of paired-associates by educable mentally retarded children. American Journal of Mental Deficiency, 1971, 76, 60-67.

Types of verbal elaboration in the paired-associate learning of mentally retarded children. American Journal of Mental Deficiency, 1971, 76, 306-312.

Elaboration structure and list length effects on verbal elaboration phenomena. Journal of Experimental Child Psychology, 1972, 14, 184-195.

Effects of brain-injury and other subject characteristics on paired-associate performance under paragraph elaboration. American Journal of Mental Deficiency, 1973, 78, 70-76.

Relational and structural components in verbal elaboration with young children. Proceedings of the 81st annual convention of the American Psychological Association, 1973, 8, 83-84.

Verbal elaboration and the promotion of transfer of training in educable mentally retarded children. Journal of Experimental Child Psychology, 1973, 15, 137-148.

The effects of structural variations in elaboration on learning by EMR and nonretarded children. American Journal of Mental Deficiency, 1975, 79, 632-639.

The effects of interrogative elaborations in the learning of normal and EMR children. Proceedings of the Third Congress of the International Association for the Scientific Study of Mental Deficiency, Vol. 1, Primrose (Ed.). Warsaw, Poland: Polish Medical Publishers, 1975, 54-59.

Acquisition and reversal of paired-associates by young children under extended verbal discourse. Journal of Genetic Psychology, 1976, 128, 251-261.

The effectiveness of interrogatives for promoting verbal elaboration productivity in young children. Child Development, 1976, 47, 851-855.

A cross-cultural study of verbal elaboration productivity and memory in young children. Child Development, 1977, in press.

Center Reports

The effects of varied levels of verbal mediation on the learning and reversal of paired-associates by educable mentally retarded children. Research Report #5. June 1970.

Syntactic elaboration in the learning and reversal of paired-associates by young children. Research Report #7. January 1971.

Two studies on verbal elaboration in special populations. I. The effects of brain injury; II. Evidence of transfer of training. Research Report #17. April 1971.

Mental elaboration and the extension of mediational research: List length effects on verbal phenomena in the mentally retarded. Research Report #19. June 1971.

Verbal elaboration and the promotion of transfer of training in educable mentally retarded children. Research Report #25. November 1971.

Verbal elaboration phenomena in nursery school children. Research Report #28. December 1971.

Verbal elaboration in children: Variations in procedures and design. Research Report #34. March 1972.

The effects of structural variations in elaborations on learning by normal and EMR children. Research Report #41. September 1972.

The effects of interrogative elaborations on the learning of normal and EMR children. Research Report #44. January 1973.

The latency of forward and backward association responses in an elaboration task. Research Report #47. March 1973.

Verbal elaboration and the enhancement of language abilities in the mentally retarded: The role of interrogative sentence-forms. Occasional Paper #20. October 1973.

Interrogative types of parental speech to language learning children: A linguistic universal? Research Report #56. December 1973.

The universality of self-generated verbal mediators as a means of enhancing memory processes. Research Report #58. January 1974.

The production deficiency model of verbal elaboration: Some contrary findings and conceptual complexities. Research Report #62. January 1975.

The comprehension and production of interrogatives in the language of normal and retarded children: A review and analysis. Occasional Paper #32. February 1975.

Down's syndrome children's early comprehension of Wh Questions asked in naturalistic and experimental settings. Research Report #87. March 1975.

Relations and the effectiveness of verbal elaboration. Research Report #89. May 1975.

A contextualist view of sentential semantic considerations in paired-associates research. Research Report #100. July 1976.

Toward the clarification of classroom contexts: Pragmatic preliminaries to effective instruction. Occasional Paper #36. December 1976.

Improving the Measurement and Teaching of Coding Skills in Children with Learning Disabilities

(Gallistel)

Purpose: To investigate coding skills in children and the effects of instruction in improving such skills.

History: The project was first funded in 1971, and became Project II-2 following reorganization of the Center in 1972. The project terminated December 1972.

Research Activities and Findings: The project's activities were concerned with developing measures of coding skills in reading and spelling that would provide information not available from global, norm-referenced tests. The project also investigated the effects of differing reading methods and early aptitudes on the development of coding skills to improve the decision making process for assigning learning disability children to the most effective reading method.

Educational Products

Center Reports

Decoding skills acquired by low readers taught in regular classrooms using clinical techniques. Research Report #35. May 1972.

The relation of visual and auditory aptitudes to first grade low readers' achievement under sight-word and systematic phonic instruction. Research Report #36. May 1972.

The Assessment and Training of Young Educationally Handicapped Children in the Use of Systematic Strategies for Organizing and Remembering

(Riegel)

Purpose: To develop and evaluate procedures for assessing and training adaptive strategies for organizing and memorizing in young handicapped children.

History: The project was first funded in 1973 as Project II-2 in Program Area II. The project was completed June 1974.

Research Activities and Findings: Initial activities of the project were concerned with (a) developing and evaluating the SORTS test, an assessment instrument for "Sampling Organization and Recall Through Strategies," (b) analyzing elaborations used in the classroom, and (c) developing an elaboration training program. A second form of the SORTS test was developed, and its reliability verified. A package of training materials for the improvement of classification skills in young handicapped children was developed. Further, the project investigated the relationships between children's classification and memorization skills and performance on specific reading, decoding, and comprehension measures.

Educational Products

Instructional Materials

Improving organization and memory: A sequentially arranged set of activities to improve the learning and retention capabilities of young educationally handicapped children. Experimental copy. May 1973.

SORTS test, administration and scoring manual.

Journal Articles

A comparison of conceptual strategies for grouping and remembering employed by educable mentally retarded and nonretarded children. American Journal of Mental Deficiency, 1974, 78, 592-598.

Center Reports

Measuring educationally handicapped children's organizational strategies by sampling overt groupings. Research Report #37. May 1972.

Steps in sequence: Training educationally handicapped children to use strategies for learning. Development Report #2. November 1972.

Training educationally handicapped children to use associative grouping strategies for the organization and recall of categorizable materials. Research Report #42. November 1972.

A comparison of conceptual strategies for grouping and remembering employed by educable mentally retarded and non-retarded children. Research Report #46. February 1973.

Strategies in the classroom: A summer remedial program for young handicapped children. Occasional Paper #14. March 1973.

The effects of training in the use of grouping strategy on the learning and memory capabilities of young EMR children. Research Report #48. April 1973.

Developmental trends in the generation and utilization of associative relations for recall by EMR and non-retarded children. Research Report #54. August 1973.

Reliability of children's sorting strategies using alternative forms of the SORTS test. Research Report #68. August 1974.

A Mastery-Based Experimental Program for Teaching Mentally Retarded Children Word Recognition and Reading Comprehension Skills Through Use of Hypothesis/Test Procedures

(Samuels)

Purpose: To develop and evaluate an instructional model designed to enhance word recognition and general reading skills of mentally retarded children.

History: The project was first funded in 1972 as Project II-3, a part of Program Area II. In 1974 this project was designated as Project II-3B to indicate its close relationship with two related investigations initiated to study related phenomena in the reading processes of handicapped children. These related studies (II-3A, Accuracy and speed (automaticity) of word recognition and their relationship to comprehension in mental retardates; II-3C. Facilitating reading speed and comprehension by means of repeated reading of the same passage) were conducted during 1974, with the former continuing into 1975. Because of their closeness, the educational products of all studies are summarized here in one listing. The project terminated August 1976.

Research Activities and Findings: Initial research activities involved an in-class study to improve reading skills in mentally retarded children by using procedures for training them (a) to use context in a reading passage to predict words that could logically follow, (b) to use minimal visual cues in word recognition, (c) in sound-letter correspondence, and (d) to use minimal visual cues to test predictions.

With the success of these procedures supported by the study, the project turned to (a) the development of a set of instructional procedures for classroom teachers consisting of a complete listing of objectives and measures required for teaching the subskills necessary in fluent reading, (b) the study of "automaticity," and (c) the examination of using repeated readings as a means for facilitating reading speed and comprehension. On the basis of test score data, observations, and teacher suggestions, the set of instructional procedures was revised and additional materials for student use were prepared.

Educational Products

Instructional Materials

Reading for Meaning, 1976.

Method of Repeated Readings, a curricula method used in cassette center for Title I, 1976.

Books and Chapters in Books

IQ, learning ability and reading achievement. In Reading for diverse learners. Newark, Del.: International Reading Association Press, 1974.

Journal Articles

Success and failure in reading - a critique. Reading Research Quarterly, 1973, 8, 200-239.

Visual recognition memory, paired associate learning and reading achievement. Journal of Educational Psychology, 1973, 65, 110-167.

Effect of distinctive feature training on paired-associate learning. Journal of Educational Psychology, 1973, 64, 164-170.

Ghetto children can learn to read. The Reading Teacher, 1973, 27, 22-24.

Effects of pictures on children's attitude about reading. Journal of Educational Research, 1974, 67, 243-246.

Toward a theory of automatic information processing in reading. Cognitive Psychology, 1974, 6, 293-323.

Effect of pictures and contextual conditions on learning to read. Reading Research Quarterly, 1974, 9, 555-567.

Effect of hypothesis/test training on reading skill. Journal of Educational Psychology, 1974, 66, 835-844.

Establishing appropriate purpose for reading and its effect on flexibility of reading rate. Journal of Educational Psychology, 1975, 67, 38-43.

Reading achievement: A case for criterion referenced testing and accountability. National Council for Measurement in Education, 1975, 6, 1-7.

Relationship between age and accuracy of foreign language pronunciation. Journal of Educational Research, 1976, 66, 263-268.

Center Reports

Attention and visual memory in reading acquisitions. Research Report #26. November 1971.

Success and failure in learning to read: A critique of the research. Occasional Paper #9. November 1971.

A mastery based experimental program for teaching mentally retarded children word recognition and reading comprehension skills through use of hypothesis/test procedures. Research Report #50. May 1973.

Relationships among IQ, learning ability, and reading achievement. Occasional Paper #16. May 1973.

Automaticity, reading and mental retardation. Occasional Paper #17. May 1973.

A mastery based experimental program for teaching poor readers high speech word recognition skills. Research Report #55. September 1973.

Effects of pictures and contextual conditions on learning to read. Occasional Paper #25. March 1974.

Initial field test and feasibility study of the hypothesis/test word recognition procedures in the special education classroom. Research Report #74. December 1974.

Effects of degradation and frequency upon accuracy and latency of word identification by beginning readers. Research Report #99. January 1976.

Code versus meaning emphasis in reading instruction--Which should we use? Occasional Paper #35. July 1976.

The relationships between speed and accuracy of word recognition and literal comprehension in beginning readers. Research Report #102. October 1976.

Developing Vocabulary Concepts in EMR Children

(Taylor, Turnure, Thurlow, Krus)

Purpose: To investigate learning and memory strategies in handicapped children and to develop vocabulary materials based upon appropriate learning and memory strategies.

History: The project was initiated in 1971 as a project to investigate strategies for increasing the efficiency of cognitive processes in EMR children. With the reorganization of the Center in 1972, the project joined Program Area II as Project II-4. Vocabulary development materials became the major focus of the project in 1973. The project terminated August 1975.

Research Activities and Findings: Project activities during the first two years of funding focused on investigations of strategies for increasing the efficiency of cognitive processes in EMR children. The strategies were tested and clarified within a summer instructional program for mentally retarded children. Elaboration strategies were a major focus of investigation and their value for learning improvement in EMR children was substantiated in several studies. Initial work within this project on organizational strategies became the basis for another Center project (Riegel - The Assessment and Training of Young Educationally Handicapped Children in the Use of Systematic Strategies for Organizing and Remembering).

In 1973, the major focus of the project became the production of vocabulary development materials for retarded children. The first major activity related to this focus was an in-class study to determine the most effective strategies to include in vocabulary development materials. The finding that an approach using both elaborations and relations was optimal became the basis for the development of six vocabulary units. All vocabulary units developed were both pilot-tested and field-tested before final revision. The effectiveness of the units for both EMR and TMR students was verified.

Extensive evaluation undertakings also became the basis for models of formative and summative evaluation designs. A culminating activity of the project was the production of a monograph of guidelines for the development of vocabulary materials.

Educational Products

Instructional Materials

The Money, Measurement and Time Program: Teacher's Introduction. October 1973. (Revised Edition: March 1975).

Money: Developmental Version, 1973-74. Testing Manual, 1974. Unit Introduction, 1974.

Measurement of Length: Developmental Version, 1973-74. Testing Manual, 1974. Unit Introduction, 1974.

Measurement of Weight: Developmental Version, 1973-74. Testing Manual, 1974. Unit Introduction, 1974.

Time with the Clock: Developmental Version, 1973-74. Testing Manual, 1974. Unit Introduction, 1974.

Time with the Calendar: Developmental Version, 1974. Testing Manual, 1974. Unit Introduction, 1974.

My City: Developmental Version, 1974.

Let's teach vocabulary: Guidelines for the development of elaboration-based vocabulary instruction. Development Report #4. August 1975.

Journal Articles

Mental elaboration and learning in EMR children. American Journal of Mental Deficiency, 1972, 77, 69-76.

Elaboration instruction and verbalization as factors facilitating retarded children's recall. Journal of Educational Psychology, 1973, 64, 341-346.

Overt verbalization and the continued production of effective elaborations by EMR children. American Journal of Mental Deficiency, 1973, 78, 193-198.

Instructional treatments based on learning strategies and the recognition memory of retarded children. American Educational Research Journal, 1973, 10, 337-343.

Integrated pictures and relational imagery training in children's learning. Journal of Experimental Child Psychology, 1973, 16, 47-54.

A formative evaluation design for assessing instructional materials. Studies in Educational Evaluation, 1975, 1, 131-137.

Summative evaluation of instructional materials. Studies in Educational Evaluation, in press.

Techniques for the vocabulary development of educable mentally retarded children. Exceptional Children, in press.

Children's knowledge of time and money: Effective instruction for the mentally retarded. Education and Training of the Mentally Retarded, accepted for publication.

Center Reports

Mental elaboration and learning in retarded children. Research Report #22. September 1971.

Elaboration training and verbalization as factors facilitating retarded children's recall. Research Report #24. October 1971.

Pictures and relational imagery training in children's learning. Research Report #29. December 1971.

Overt verbalization and the continued production of effective elaborations by EMR children. Research Report #38. June 1972.

Variations of strategy training and the recognition memory of EMR children. Research Report #40. September 1972.

The teacher's introduction to: The Math Vocabulary Program. Development Report #1. March 1973.

Elaboration as an instructional technique in the vocabulary development of EMR children. Research Report #59. March 1974.

The formative evaluation design of the vocabulary development project. Occasional Paper #31. October 1974.

Summative evaluation of the Money Unit of the Money, Measurement and Time Program. Research Report #70. October 1974.

Summative evaluation of the Measurement of Length Unit of the Money, Measurement and Time Program. Research Report #71. October 1974.

Summative evaluation of the Measurement of Weight Unit of the Money, Measurement and Time Program. Research Report #72. October 1974.

Summative evaluation of the Time with the Clock Unit of the Money, Measurement and Time Program. Research Report #73. October 1974.

Money Unit: A formative evaluation. Research Report #76. December 1974.

Measurement of Weight Unit: A formative evaluation. Research Report #77. December 1974.

Time with the Clock Unit: A formative evaluation. Research Report #84. February 1975.

Measurement of Length Unit: A formative evaluation. Research Report #85. February 1975.

Time with the Calendar Unit: A formative evaluation. Research Report #86. February 1975.

An assessment of the effectiveness of the Money, Measurement and Time Program for EMR children. Research Report #88. March 1975.

An assessment of the effectiveness of the Money, Measurement and Time Program for TMR students. Research Report #90. May 1975.

Reading Improvement Through Training in Verbal Self-Instruction and Efficient Information Processing

(Wozniak and Egeland)

Purpose: To identify visual information processing skills essential to school success and to develop a basic visual information processing training program.

History: The project was first funded in 1972 as Project II-5 in Program Area II. The project terminated August 1976.

Research Activities and Findings: The activities of the project were divided into four phases: (1) initial replication and extension of research relating cognitive impulsivity to relatively low reading performance, (2) development of a verbal self-instruction training curriculum, (3) implementation and assessment of the training program, and (4) a four month follow-up assessment of the effects of the training program. Phase 1 results indicated that impulsive children do score well below their reflective age-mates in reading achievement. Further, verbal self-instruction was demonstrated to be a successful approach for modifying impulsivity and thereby increasing reading performance.

During 1973, a program for promoting efficient information processing was merged with the verbal self-instruction materials being developed. Materials were developed for both visual and auditory information processing. The curricula were field-tested and revised. Activities were also undertaken to develop measures to identify children with visual information processing problems, resulting in a diagnostic battery that specifically assesses children's level of skill in approaching visual material systematically and responding to the hierarchical and dimensional difference nature of the information contained in a visual array.

In its final year, the project disseminated the visual-information processing training program to selected schools, revised the visual-information processing diagnostic battery, and completed the development and evaluation of the auditory information-processing training program.

Educational Products

Instructional Materials

Learning to look and listen - A visual information processing training program. Development Report #5. August 1975.

Journal Articles and Published Proceedings

Training impulsive children in the use of more efficient scanning techniques. Child Development, 1974, 45, 165-171.

Training impulsive children in the use of more efficient scanning techniques. Proceedings of the 81st Annual Convention of the American Psychological Association, 1973, 6, 677-678.

Selective attention of impulsive and reflective children. Contemporary Educational Psychology, in press.

Center Reports

Selective attention of impulsive and reflective children. Research Report #66. July 1974.

Psychology and education of the learning disabled child in the Soviet Union. Research Report #78. December 1974.

Visual information processing training program experimental version. Development Report #3. January 1975.

The Matching Familiar Figures Test: A look at its psychometric credibility. Research Report #97. August 1975.

Some thoughts on the verbal regulation of action, comprehension of the written word and implication for future research. Occasional Paper #34. October 1975.

Intelligence, Soviet dialectics and American psychometrics; Implications for the evaluations of learning disabilities. Occasional Paper #37. April 1977.

SUPPORTIVE PROGRAM: A Measurement Consultative Service with the Research, Development and Demonstration Center

(Bart and Krus)

Purpose: To provide a measurement service that would resolve the measurement problems of Center researchers.

History: The supportive program was initiated in 1972 and terminated December 1974.

Research Activities and Findings: The supportive program developed two computer programs to perform (a) behavioral hierarchy, and (b) ordering-theoretic data analysis. Bi-weekly sessions were also held to aid Center researchers in solving their measurement problems. A program in which parents of handicapped children were trained to become skilled observers and data recorders of the intellectual and communicative capabilities of their children was developed and validated.

Educational Products

Books and Contributions to Books

A hierarchy among attitudes toward the environment. In C. Schoenfeld (Ed.), Interpreting environmental issues. Madison, Wis.: Dembar Educational Research Services, 1973.

Journal Articles

An algebraic representation of concepts. Journal of Structural Learning, 1972, 3, 27-35.

A hierarchy among attitudes toward the environment. Environmental Education, 1972, 4, 10-14.

Ordering theory: A new and useful measurement model. Educational Technology, 1973, 13, 56-60.

An ordering-theoretic model to determine hierarchies among items. Educational and Psychological Measurement. 1973, 33, 291-300.

Determination of the ordering among seven Piagetian tasks by an ordering-theoretic method. Journal of Educational Psychology, 1974, 66, 277-284.

Test validity and reliability from an ordering theoretic framework. Educational Technology, 1974, 14, 62-63.

Center Reports

An ordering-theoretic method to determine hierarchies among items. Research Report #23. September 1971.

An ordering-theoretic method of multidimensional scaling of items. Research Report #33. March 1972.

The process of cognitive structure complexification. Research Report #49. April 1973.

An interpretative framework of cognitive structures. Occasional Paper #19. June 1973.

The pseudo-problem of IQ. Occasional Paper #21. October 1973.

Order analysis: A fortran program for generalizable multi-dimensional analysis of binary data matrices. Occasional Paper #22. November 1973.

An outline of the basic concepts of order analysis. Occasional Paper #23. February 1974.

Synopsis of basic theory and techniques of order analysis. Occasional Paper #26. April 1974.

Ordering theory and methods. Occasional Paper #28. July 1974.

A set-theoretic model for the behavioral classification of environments. Occasional Paper #29. July 1974.

ECHO: A computer based test for the measurement of individualistic, cooperative, defensive and aggressive modes of behavior. Occasional Paper #30. September 1974.

Effects of Three Organizational Approaches in Providing Services to Educable Mentally Retarded Children

(Bruininks and Rynders)

Purpose: To assess the degree to which individual differences in pupils, teachers, communities and schools influence pupil's achievement and adjustment within and across three types of educational programming for educable mentally retarded children (tutorial, resource, special class).

History: The project was funded during 1971; it was then continued through the Minneapolis school system without RD&D Center support.

Research Activities and Findings: During its association with the Center, the project assessed academic achievement, pupil attitude and morale, pupil classroom behavior, pupil relationships with other classmates, pupil evaluation of his/her own attitudes, parental evaluation of the instructional program, teacher attitudes toward retarded children, and the pupil's instructional program. Data were collected and a variety of analyses conducted to determine the relationship of pupil achievement to environmental variables, including the three organizational approaches.

Educational Products

Journal Articles

Alternatives in special class placement for educable mentally retarded children. Focus on Exceptional Children, 1971, 3, 1-12.

Center Reports

Alternatives to special class placement for educable mentally retarded children. Occasional Paper #6. March 1971.

A Cooperative Resource Center for Educable Mentally Retarded Children: A Developmental and Demonstration Proposal

(Rynders, Grismer, and Bruininks)

Purpose: To conduct studies on instructional methods and materials, and to compare the progress of labeled and nonlabeled children in an existing resource center for EMR children.

History: The project was funded during 1969 and 1970.

Educational Products

Journal Articles

Social acceptance of mildly retarded pupils in resource rooms and regular classes. American Journal of Mental Deficiency, 1974, 78, 377-383.

Center Reports

Social acceptance of mildly retarded pupils in resource rooms and regular classes. Research Report #45. January 1973.

A Developmental Investigation of the Effects of Extraneous Visual and Auditory Stimulation on the Orienting Behavior of Normal and Retarded Children

(Turnure)

Purpose: To investigate the effects of extraneous stimuli on the attention of children.

History: The project was initiated in 1969 and continued until December 1971.

Research Activities and Findings: The original research activities of the project focused on the relation between attention and learning. The approach was expanded in 1971 to include (a) exploratory work on classroom observations of students' task attentiveness and its correlation to reading achievement, and (b) investigations of the effects of a wide range of instructional and feedback conditions on orienting behaviors of retarded children. Results of the project's initial research indicated that characteristics of mentally retarded individuals which propose an orienting inadequacy should be questioned. Further, the research suggested the complexity of interpersonal interactions between experimenter and learner in learning conditions and tasks.

Educational Products

Journal Articles

Children's reactions to distractors in a learning situation. Developmental Psychology, 1970, 2, 115-122.

Distractibility in the mentally retarded: Negative evidence for an orienting inadequacy. Exceptional Children, 1970, 37, 181-186.

Reactions to physical and social distractors by moderately retarded institutionalized children. Journal of Special Education, 1970, 4, 283-294.

Control of orienting behavior in children under five years of age. Developmental Psychology, 1971, 4, 16-24.

Perceptual inadequacy and communication ineffectiveness in interpersonal communication. Child Development, 1971, 42, 2084-2088.

Outerdirectedness in educable mentally retarded boys and girls. American Journal of Mental Deficiency, 1973, 78, 163-170.

Attention and reading achievement in first grade boys and girls. Journal of Educational Psychology, 1974, 66, 29-32.

Center Reports

Reactions to physical and social distractors by moderately retarded institutionalized children. Research Report #3. June 1970.

Outerdirectedness in educable mentally retarded boys and girls. Research Report #21. September 1971.

Outerdirectedness in mentally retarded children as a function of sex of experimenter and sex of subject. Research Report #31. March 1972.

Effects of various instruction and reinforcement conditions on the learning of a three-position oddity problem by nursery school children. Research Report #32. March 1972.

Attention and reading achievement in first grade boys and girls. Research Report #43. November 1972.

Interrelations of orienting response, response latency and stimulus choice in children's learning. Research Report #52. May 1973.

Perceptual Aptitudes Related to the Development of Early Reading Skills

(Bruininks and Clark)

Purpose: To investigate specific perceptual and other aptitude characteristics and their relation to the development of initial reading skills.

History: The project was first funded in 1969. The project terminated December 1971.

Research Activities and Findings: Initial research activities were designed to determine whether mentally retarded children are deficient in the ability to process information received via separate sense modalities in an integrative manner and to confirm that such abilities in fact are related to educationally relevant behaviors such as reading. Contrary to predictions based upon accumulated evidence for normal pupils, the project's findings indicated that the children performed best under visual and combined auditory-visual conditions.

Educational Products

Journal Articles

Change and stability in correlations between intelligence and reading test scores among disadvantaged children. Journal of Reading Behavior, 1970, 2, 295-305.

Teaching word recognition to disadvantaged boys with variations in auditory and visual perceptual abilities. Journal of Learning Disabilities, 1970, 3, 30-39.

Auditory and visual paired-associate learning in first-grade retarded and nonretarded children. American Journal of Mental Deficiency, 1972, 76, 561-567.

Issues in determining prevalence of reading retardation among elementary school children. Reading Teacher, 1973, 27, 177-185.

Center Reports

Change and stability in correlations between intelligence and reading test scores among disadvantaged children. Research Report #11. October 1970.

Teaching word recognition to disadvantaged boys with variations in auditory and visual perceptual abilities. Research Report #12. November 1970.

Auditory and visual learning in first grade educable mentally retarded and normal children. Research Report #13. November 1970.

Auditory and learning in first-, third-, and fifth-grade children. Research Report #14. November 1970.

Prevalency of learning disabilities: Findings, issues, and recommendations. Research Report #20. June 1971.

Patterns and Sequences of Cognitive Development

(Feldman)

Purpose: To conduct several studies to investigate cognitive development in children and the diagnosis and treatment of cognitive development difficulties.

History: The project was first proposed in 1969 to investigate biosocial and cognitive characteristics of handicapped children that interact with treatment variables. The project expanded to include several related investigations during 1971. The project terminated December 1971.

Research Activities and Findings: In its first year of funding, the project investigated the influences of differing backgrounds of handicapped children on cognitive development and their interactions with the kinds of treatment given to the children.

Four lines of research developed from this initial investigation: (a) exploration of specific sequences through which concepts and skills are acquired, (b) collection of information to provide meaningful profiles of the child's intellectual strengths and weaknesses in relation to the child's mental organization and in relation to performances of the child's peers, (c) development of a computer program using tree theory to reanalyze sequential data to determine whether complex patterns more appropriately describe the acquisition of concepts and skills than linear descriptions, and (d) development of instruments to diagnose general developmental stages of reasoning and specific problems in the acquisition of certain school tasks.

The tree theory computer program was developed and used for other Center projects as well. An instrument diagnosing reasoning development and map skills was field-tested and revised.

Educational Products

Journal Articles

Systematic scoring of ranked distractors for the assessment of Piagetian reasoning levels. Educational and Psychological Measurement, 1973, 31, 347-362.

Map understanding as a possible crystallizer of cognitive structures. American Educational Research Journal, 1971, 3, 484-502.

Center Reports

The fixed-sequence hypothesis: Individual differences in the development of school related spatial reasoning. Research Report #1. March 1970.

Systematic scoring of ranked distractors for the assessment of Piagetian reasoning levels. Research Report #2. March 1970.

On the relativity of giftedness: An empirical study. Research Report #8. August 1970.

Map understanding as a possible crystallizer of cognitive structures. Occasional Paper #4. January 1971.

Unusualness, appropriateness, transformation and condensation as criteria for creativity. Research Report #16. February 1971.

Modification of Speech

(Martin)

Purpose: To develop effective techniques for bringing stuttering under control in young stutterers.

History: The project was first funded in 1969 and continued until its completion in 1971.

Research Activities and Findings: The activities of the project focused on extending and adapting procedures devised for use with adult stutterers to young stutterers in schools. A time-out procedure was devised which was sufficiently inexpensive and uncomplicated that it could be used in a typical school building. The effectiveness of the procedure was examined in a single-subject design with a 12-year-old boy, with the data indicating that the procedure results in a definite decrease in the frequency of stuttering. A second line of research in the project involved the construction of a puppet apparatus designed to engage preschool children in conversation for relatively long periods of time.

Educational Products

Journal Articles

The effects of time-out on stuttering in a 12-year-old boy. Exceptional Children, 1970, 37, 303-304.

Center Reports

The effects of time-out on stuttering in a 12-year-old boy. Research Report #6. July 1970.

Language Retardation

(Siegel)

Purpose: To investigate the interpersonal communication skills of the mentally retarded and to optimize language interactions between teachers and handicapped children.

History: The project was initiated in 1969 and terminated December 1971.

Research Activities and Findings: Research activities in the project developed out of the finding that adults tend to use more redundant speech with children of low verbal levels as opposed to those with high verbal abilities. During its association with the Center, the project investigated (a) the effects of contingent and noncontingent social stimulation on infant vocalizations, (b) the effects of adult verbal patterns on verbal output of mentally retarded children, (c) the effects of transmission line failure on communication with adults, and (d) the effects of experimental therapy for children with clinically severe language problems. The third line of research revealed that speakers alter their speech in relation to the behavior of their listener (e.g., if a listener was not performing a task correctly, the speaker gave longer descriptions, spoke more slowly, and used more redundant speech).

Educational Products

Journal Articles

Variations in normal speech disfluencies. Language and Speech, 1972, 15, 219-231.

Center Reports

Variations in normal speech disfluencies. Research Report #15. January 1971.

Three approaches to speech retardation. Occasional Paper #8. May 1971.

Development and Evaluation of a Model Teacher Education Program in Special Education

(Wood and Deno)

Purpose: To develop a general model for curriculum reorganization involving the development of clear and effective training programs within special education.

History: The project was initiated in 1969 by Wood and taken over by Deno in 1971. The project terminated December 1971.

Research Activities: DeCecca's revision of Glaser's basic training model was introduced into on-going training activities in the special education department. Termination of the project prevented completion of three proposed activities: (a) survey of programs in terms of model; (b) development of product evaluation system, and (c) development of a program self-adjustment system. The outlined activities have been continued as part of the department's task force activities.

Follow-up of the Language and Cognitive Performance of 22-year-old Deaf Subject

(Templin)

Purpose: To obtain follow-up measures on previously tested deaf subjects to determine whether improvement on language and cognitive variables ocurred after 14 years of age.

History: The project was initiated in 1972, as part of Program Area I, and completed the same year.

Research Activities and Findings: The project was initiated to follow-up on the oldest deaf subjects who had participated in a modified longitudinal study conducted in the 1960's to compare the performances of hearing and deaf children. In that study it was found that at 14 years of age, the performances of the deaf subjects were at a low level, and no substantial improvement had been made between 12 and 14 years of age. In the present project, comparisons were made of the performances of the deaf subjects at ages 12 and 14, 12 and 22, and at 14 and 22, and of the performance of the deaf at 22 with that of the hearing at all ages tested in the earlier study.

The findings of the project indicated that the deaf subjects increased their level of performance between the ages of 14 and 22, with the scores on most tests increasing significantly. However, the level of achievement attained varied considerably with the particular measure considered. For example, scores obtained on Raven's Progressive Matrices approached the maximum score, while on the Watts Multiple Meaning of Words, the mean score at 22 years was less than half the maximum score, and much below that of younger hearing subjects.

Products

Educational Materials and Guidelines

Charlesworth, W. R., Kjergaard, L., Fausch, D., Daniels, S., Binger, K., and Spiker, D. A method for studying adaptive behavior in life situations: A study of everyday problem solving in a normal and Down's syndrome child. Development Report #6. October 1976.

This manual provides a conceptualization of children's adaptive behaviors in everyday life situation and presents a method for operationally observing, recording, and analyzing it. The scheme involves a break-down of problems and problem behavior into six elements: (1) the context in which the problem occurs, (2) the specific problem or blocking condition that disrupts the ongoing behavior, (3) the ongoing behavior itself, (4) the individual's response(s) to the blocking condition, (5) the result of the response (whether the block is removed or not), and (6) the outcome (whether the original ongoing behavior is resumed or not). The value of the approach presented in the manual lies in the potential for providing as clear and as complete a picture as possible of the problematic nature of the child's environment and how the child interacts with it. Such a picture will help educators make better predictions about future adaptations of individual children as well as contribute to a more rational program of intervention for children who need it.

Clark, C., & Greco, J. MELDS (Minnesota Early Language Development Sequence) glossary of rebuses and signs. Occasional Paper #18. June 1973.

This manual is a reference glossary of 99 pages of signs and rebuses used in the MELDS program.

Clark, C., Moores, D., & Woodcock, R. MELDS (Minnesota Early Language Development Sequence): Classroom Kit (Development Kit #1), August 1975.

The MELDS program combines the vocal mode, a manual mode (American Sign Language), and a symbol mode (rebuses) in order to teach language to very young deaf children. The classroom kit includes instructional materials for the classroom teacher. When using the program, the teacher points to, says, and signs each word and demonstrates the meaning physically or with objects or pictures. MELDS has been used successfully with hearing impaired children, severely mentally retarded individuals, and children having developmental language deficits.

Clark, C., Moores, D., & Woodcock, R. MELDS (Minnesota Early Language Development Sequence): Parent Kit (Development Kit #2), August 1975.

The Parent Kit of the MELDS program is to be used by parents in the home setting, and is designed to reinforce the combination of the vocal mode, a manual mode (American Sign Language), and a symbol mode (rebuses) to teach language to very young deaf children. The parent using the program proceeds in a manner similar to the classroom teacher, pointing to, saying, and signing each word as the meaning is physically demonstrated with objects or with pictures.

Moores, D. F., Harlow, M. P., & Fisher, S. D. Post-secondary programs for the deaf: VI. Summary and Guidelines. Research Report #80. December 1974.

This manual grew out of an evaluation of three federally funded model post-secondary programs for adult hearing impaired individuals established within existing hearing institutions. The manual 1) advances recommendations concerning organizational structure, program priorities, and role definitions, 2) delineates the minimal key staff necessary for the establishment of programs, and 3) identifies those support services that might be desirable but not necessary for an adequate post-secondary vocational-technical training program for the deaf.

Moores, D. F., Weiss, K., & Goodwin, M. Recommended policies and procedures: Preschool programs for hearing impaired children. Research Report #104. November 1976.

This manual was developed as a result of a five-year evaluation of seven preschool programs for the deaf. The programs, which represented a variety of methodological approaches and philosophies of education, were evaluated each fall and spring. Rather than identifying one "best" approach to preschool education for the deaf child, the project has identified those variables predictive of success. Among the recommendations in the manual are the need for greater attention to academic subject in the preschool curriculum, greater exposure of the deaf preschooler to deaf adult models, and the use of manual means of communication as well as oral communication in order to increase the avenues of input to the deaf preschool child.

Riegel, R. H. SORTS test, administration and scoring manual.

The SORTS (Sampling Organization and Recall Through Strategies) test utilizes children's sorting responses, interview techniques, and recall protocols to derive three basic scores: 1) an index of the sorting level, 2) the number of correctly recalled items, and 3) an index of clustering. These scores have been shown to provide useful information in the diagnosis of information processing abilities of young children. Further, the test provides a new perspective on the planning and development of educational intervention techniques. Two forms of the test are available.

Riegel, R. H., Danner, F. W., Johnson, L. S., & Kjerland, L. K. Improving organization and memory: A sequentially arranged set of activities to improve the learning and retention capabilities of young educationally handicapped children. Experimental copy. May 1973.

The training sequence presented in this manual focuses on teaching young handicapped children to use a grouping strategy as a systematic way to seek relations or associations between items, to label these associations, and to use the associations as a way to later remember the specific items which were grouped.

Rynders, J. E., & Horrobin, J. M. To give an EDGE: A guide for new parents of Down's syndrome (mongoloid) children. Minneapolis: Colwell Press, 1974.

This book is designed to help parents of newborn Down's syndrome make decisions which will affect their child's future and their lives as a family unit. The book, which contains contributions from parents of Down's syndrome children, a speech therapist, and a teacher of preschool retarded children, covers a variety of topics, including language stimulation, muscular development, everyday training activities, and the importance of play. Published in 1974, nearly 10,000 copies have been disseminated at cost, and it is about to be printed in a third edition of 5,000 copies.

Samuels, S. J. Method of repeated readings. 1976.

The Method of Repeated Readings is a cassette program that is an adjunct method to be used with retarded children in addition to their regular reading method. The method has been empirically tested and improves both fluency and comprehension. It is currently being used in the Minneapolis Public School System, and is being produced by the Cassette Center under Title I Programs.

Samuels, S. J. Reading for meaning. 1976

The Reading for Meaning Program includes a 275 page teacher's guide and an accompanying student workbook. The eight units in the teacher's guide were derived from task analyses of the strategies used in word recognition. In addition to the eight units, the teacher's guide contains a rationale, an explanation of the purpose underlying the program, detailed instructions on how to conduct units, and the materials for the units. The improvement of reading skills resulting from this program has been verified in several empirical tests.

Taylor, A. M., Turnure, J. E., & Thurlow, M. L. The city. Developmental version, 1974.

The city is a elaboration-based vocabulary unit designed to introduce educationally handicapped children to cities in general, and, more specifically, to their own city.

Taylor, A. M., Turnure, J. E., & Thurlow, M. L. The money, measurement, and time program: Teacher's introduction; Money unit; Measurement of length unit; Measurement of weight unit; Time with the clock unit; Time with the calendar unit. Developmental Version. 1973-75.

The Money, Measurement and Time Program is an elaboration-based instructional program designed to provide young educationally handicapped learners with a basic understanding of the crucial areas of money, measurement, and time. The Program consists of five units, each of which includes a unit instruction, a testing manual, and from two to four books of instruction. The belief underlying the Money, Measurement and Time Program is that retarded individuals can be given systematic instruction in such content areas, even if they cannot read or do simple addition. The approach of the Program is to stress the "growth of meaning" by developing simple, specific meanings first and then systematically elaborating (adding elements of meaning) to approach the full and commonly accepted meaning of a word. As the children obtain the necessary vocabulary foundations, related skills are introduced. In taking this approach, both vocabulary and skill development are enhanced.

Thurlow, M. L., Turnure, J. E., & Howe, R. Let's teach vocabulary: Guidelines for the development of elaboration-based vocabulary instruction. Development Report #4. August 1975.

This manual is designed for use by individuals concerned with the development of instruction that will provide students with knowledge of specific content areas and with improved communication skills. The manual presents guidelines for efficiently and effectively developing elaboration-based vocabulary instruction similar to that presented in the Money, Measurement and Time Program.

Wozniak, R., & Egeland, B. Learning to look and listen--A visual information processing training program. Development Report #5. August 1975.

The Learning to Look and Listen Program is a basic visual skills program for children in the early primary grades. Although it can be used to provide visual training to children at all achievement levels, it has been developed with particular reference to children with specific learning disabilities. The program may be employed with individual children in tutorial fashion or with several children (2-5) in small group interaction. Lesson content is based on principles derived from recent research on visual perceptual learning and development, individual differences in visual information processing skills, and verbal self-instructional training.

Books, Chapters, and Research Monographs

Bart, W. A hierarchy among attitudes toward animals. In C. Schoenfeld (Ed.), Interpreting environmental issues. Madison, Wisc.: Dembar Educational Research Services, 1973.

Bart, W. A hierarchy among attitudes toward the environment. In C. Schoenfeld (Ed.), Interpreting environmental issues. Madison, Wisc.: Dembar Educational Research Services, 1973.

Bart, W., & Wong, M. (Eds.). The psychology of school learning: Views of the learner. Volume I: Environmentalism. New York: MSS, 1974.

Bart, W., & Wong, M. (Eds.). The psychology of school learning. Volume I: Nativism and interactionism. New York: MSS, 1975.

Broen, P. A. The verbal environment of the language learning child. ASHA Monographs, 1972, No. 17.

Bruininks, R. H., & Rynders, J. E. Alternatives to special class placement for educable mentally retarded children. In E. L. Meyen, G. A. Vergason, & R. J. Whelan (Eds.), Strategies for teaching exceptional children. Denver: Love, 1972.

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Egeland, B., & Schrimpf, V. Perspectives in the treatment and understanding of learning disabled children. In A. Goldstein (Ed.), Prescriptions for Child Mental Health. New York: Pergamon Press, in press.

Horrobin, J. M., & Rynders, J. E. To give an EDGE: A guide for new parents of Down's syndrome (mongoloid) children. Minneapolis: Colwell Press, 1974.

Krus, D., Bart, W., & Airasian, P. (Eds.). Ordering theory and methods. Los Angeles: Theta, 1975.

Moores, D. F. Communication: Some unanswered questions and some unquestioned answers. In T. O'Rourke (Ed.), Psycholinguistics and total communication. Washington, D.C.: American Annals of the Deaf, 1972.

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Moores, D. F. Education of children with hearing handicaps. In J. Irwin & M. Marge (Eds.), Principles of childhood language disabilities. New York: Appleton-Century-Crofts, 1972.

Moores, D. F. Families and deafness. In D. Reed (Ed.), Deafness annual. Washington, D.C.: Social and Rehabilitation Services, 1973.

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Moores, D. F. Early childhood special education for the hearing handicapped. In H. Spicker, R. Hodges, & N. Anastasiow (Ed.), Early education for the handicapped. Minneapolis: University of Minnesota Press, 1976, pp. 91-110.

Moores, D. F. Review of research in education of the deaf. In L. Mann & D. Sabatino (Eds.), Third review of special education. New York: Grune & Stratton, 1976, pp. 19-52.

Moores, D. F. Applications of research to education of deaf children. In L. Liben (Ed.), Theoretical and practical outcomes of research in the development of deaf children. Society for Research on Child Development Monograph, in press.

Moores, D. F. Educating the deaf: Psychology, principles, and practices. Boston: Houghton Mifflin, 1977 (in press).

Moores, D. F., Weiss, K. L., & Goodwin, M. W. Early intervention programs for hearing impaired children: A longitudinal assessment. ASHA Monographs, accepted for publication.

Rondal, J. A. Investigation of the regulatory power of the impulsive and meaningful aspects of speech. Genetic Psychology Monographs, 1976, 94, 3-33.

Rondal, J. A. Maternal speech to normal and Down's syndrome children matched for mean length of utterance. AAMD Monographs, in press.

Rynders, J. E. Three basic considerations in utilizing mothers as tutors of their very young retarded or potentially retarded children. In L. Morreau (Ed.), Strategies for the design of parent training programs: Intellectual stimulation and motivation of young children. Minneapolis: Central Midwest Regional Educational Library, in press.

Rynders, J. E., & Horrobin, J. Project EDGE: A communication stimulation program for Down's syndrome infants. In B. Z. Friedlander, G. Sterritt, & G. Kirk (Eds.), Exceptional infant (Vol. 3). New York: Bruner/Mazel, 1975.

Samuels, S. J., & Dahl, P. IQ, learning ability and reading achievement. In Reading for diverse learners. Newark, Del.: International Reading Association Press, 1974.

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Moores, D. F. Psycholinguistics and deafness. 1970, 115, 37-48.

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Rynders, J., & Friedlander, B. Preferences in institutionalized severely retarded children for selected visual stimulus material presented as operant reinforcement. 1972, 76, 568-573.

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Rynders, J. E., Spiker, D., & Horrobin, J. One-hundred years of low developmental expectations for Down's syndrome persons: Setting the record straight. Chicago, 1976.

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Buium, N., & Turnure, J. E. Verbal mediators and memory processes. Ontario, 1974.

International Congress of Deafness

Moores, D. F. Keynote address, Diagnostic pedagogy: Evaluation of educational outcomes. Stockholm, Sweden, 1970.

International Reading Association

Samuels, S. J. Role of aptitude and treatment interactions in reading. New Orleans, 1974.

Samuels, S. J., & Dahl, P. Training poor readers to use hypothesis/test techniques for high speed word recognition. New Orleans, 1974.

International Society for the Study of Behavioral Development

Wozniak, R. H. Speech for self as a multiply reafferent source of non-speech motor control. Ann Arbor, 1974.

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National Association of School Psychologists

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National Association for Retarded Citizens

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National Association for the Education of Young Children

Moores, D., & Hoffmeister, R. Development of language of deaf children with deaf parents using American Sign Language. Minneapolis, 1971.

National Association for the Education of Young Children (continued)

Moores, D. Considerations of a normal preschool placement for exceptional children. Minneapolis, 1971.

Prague Conference on Psychology of Human Learning and Problem Solving

Bart, W. An alternative algebraic representation of operational thought. Prague, Czechoslovakia, 1973.

Psychometric Society

Krus, D. Order analysis: An inferential model of dimensional analysis. Palo Alto, 1974.

Society for Research in Child Development

Best, B. Classificatory development in deaf children: Research on language and cognitive development. Philadelphia, 1973.

Egeland, B., Braggins, J., & Powalsky, J. Teaching children to discriminate letters of the alphabet through errorless discrimination training. Philadelphia, 1973.

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Wozniak, R. H., Herrmann, R., & Riquet, C. Natural competence vs. trained performance in children's proportionality judgments: An explication. Philadelphia, 1973.

Structural Learning

Bart, W. An algebraic theory of concepts. Philadelphia, 1972.

Bart, W. The process of cognitive structure complexification. Philadelphia, 1973.

Study Conference in School Psychology

Bruininks, R. Problems and needs in developing alternatives to classes for mildly retarded children. Philadelphia, 1972.

RELATED RESEARCH ACTIVITIES

During the Center's history, several projects have functioned in a collaborative relationship with the Center. The two largest activities were the Educational Follow-up Study (Rubin & Balow) and the deaf post-secondary study ("Improved Technical, Vocational and Academic Opportunities for Deaf People: Research Component"; Moores, Harlow, & Fisher).

Educational Follow-up Study (Rubin & Balow)

The Educational Follow-up Study is a longitudinal assessment of the educational and behavioral sequelae of prenatal, perinatal, and early childhood conditions and events. The foundation for this study is provided by the "Collaborative Project for the Study of Cerebral Palsy, Mental Retardation, and Other Neurological and Sensory Disorders of Childhood" which is a major investigation in twelve medical centers, including the University of Minnesota Hospitals, of the antecedents of neurologically related childhood disorders.

The following reports related to the Educational Follow-up Study have been disseminated through the Center:

Prevalence of school learning and behavior disorders in a longitudinal study population. Research Report #9. October 1970.

Sex differences in effects of kindergarten attendance on development of school readiness and language skills. Research Report #10. October 1970.

Follow-up of applicants for admission to graduate programs in special education. Occasional Paper #11. July 1972.

Analyzing for individual differences in evaluating compensatory education programs. Occasional Paper #27. June 1974.

Use of family history data to predict intellectual and educational functioning longitudinally from ages four to seven. Research Report #64. June 1974.

Improved Technical, Vocational and Academic Opportunities for Deaf People: Research Component (Moores, Harlow, & Fisher)

This project has drawn upon the expertise of the Center's director and two members of the Center's staff to evaluate three federally funded model post-secondary programs for the adult hearing impaired established within existing hearing institutions. Specically, the study was designed to (a) provide developing post-secondary programs with guidelines for establishing programs for the deaf, (b) determine as precisely as possible the nature of the three demonstration projects in relation to population served, courses of study offered, supportive services provided, and cost of services, (c) determine the effectiveness of the type of post-secondary programming offered by the three demonstration projects in course success, employment success, attrition, and comparison of student and non-student success, and (d) consider student characteristics in an attempt to derive implications for specific instructional vocational procedures.

Several reports related to this study have been disseminated through the Center:

Post-secondary programs for the deaf: I. Introduction and overview. Research Report #60. February 1974.

Post-secondary programs for the deaf: II. External view. Research Report #61. March 1974.

Post-secondary programs for the deaf: III. Internal view. Research Report #67. September 1974.

Post-secondary programs for the deaf: IV. Empirical data analysis. Research Report #75. December 1974.

Post-secondary programs for the deaf: V. Follow-up data analysis. Research Report #79. December 1974.

Post-secondary programs for the deaf: VI. Summary and guidelines. Research Report #80. December 1974

TRAINING

According to its records, the Center has employed a total of 362 individuals since its inception in 1969. Of this number 287 were students at time of employment. Almost one-third of employed students were majors in Special Education. There was also significant representation from Child Development and Communication Disorders. Students from Psychology, Curriculum and Instruction, Psychological Foundations and Linguistics, among others, also have been affiliated with the Center in substantial numbers. The availability of well trained, motivated highly competent students from a variety of disciplines at the University of Minnesota contributed significantly to the success of the Center.

The utilization of students in research positions, whenever possible, has served to provide practical experience with research processes such as definition of problems, review of literature, experimental design, data gathering, analysis and reporting of results. For most, it provided the only opportunity available to be involved in organized multi-disciplinary research activities. Because a majority of students employed by the Center were not majors in Special Education, an added benefit was the exposure of individuals in related fields to major issues in the education of handicapped children.

For many advanced graduate students their work in the Center in effect provided a practical apprenticeship in the complexities of conducting effective relevant research. In many cases, as shown in listings of Center dissemination activities, students were able to assume

a great amount of responsibility for specific activities. In addition, a number of students not directly employed by the Center have completed M.A. and Ph.D. dissertations on topics related to the Center research activities. Several former students affiliated with the Center are now employed in academic positions of responsibility. It is predicted that they will have considerable impact on the field of education in the years to come.

Former Students Affiliated with the Center Now in Major Academic Positions

Teara Archwamety
Assistant Professor
Department of Psychology
Chulalongkorn University
Bangkok, Thailand

Nila Bender
Assistant Professor
Department of Education
University of California at Riverside
Riverside, California

Robert Bloom
Assistant Professor
School of Education
College of William and Mary
Williamsburg, Virginia

Patricia Broen
Assistant Professor
Department of Communication Disorders
University of Minnesota
Minneapolis, Minnesota

Nissan Buium
Assistant Professor
Department of Exceptional Education
University of Wisconsin at Milwaukee
Milwaukee, Wisconsin

Charlotte Clark
Researcher
Project SEARCH
Minneapolis Public Schools
Minneapolis, Minnesota

Frederick Danner
Assistant Professor
Department of Educational Psychology
University of Wisconsin
Madison, Wisconsin

Phyllis Fischer
Assistant Professor
Department of Special Education
Southern Connecticut State College
New Haven, Connecticut

Arlyne Gutmann
Assistant Professor
Division of Adolescent and Child Psychiatry
Medical School
University of Minnesota
Minneapolis, Minnesota

Bruce Hanson
Assistant Professor
Department of Communication Disorders
Mankato State University
Mankato, Minnesota

Robert Hoffmeister
Assistant Professor
Department of Special Education
Temple University
Philadelphia, Pennsylvania

Ann Kennedy
Associate Professor
Department of Education
University of Moncton
Moncton, New Brunswick, Canada

David Krus
Assistant Professor and Director
Measurement Center
University of Arizona
Tempe, Arizona

Patricia Krus
Assistant Professor
Department of Special Education
University of Arizona
Tempe, Arizona

Patricia Kuhl
Assistant Professor
Department of Communicative Disorders
University of Washington
Seattle, Washington

Thomas Longhurst
Associate Professor
Department of Communication Disorders
Kansas State University
Manhattan, Kansas

Winston Markwalder
Chairman
Department of Special Education
Louisiana Tech University
Ruston, Louisiana

Robert Hunt Riegel
Assistant Professor
Department of Special Education
Western Michigan University
Kalamazoo, Michigan

Jean Rondal
Professor
Department of Special Education
University of Fribourg
Fribourg, Switzerland

Pamela Terry
Assistant Professor
Department of Special Education
Indiana University
Bloomington, Indiana

Susan Whitely
Assistant Professor
Department of Psychology
University of Kansas
Lawrence, Kansas

Judith Wolf
Assistant Professor
Department of Educational Administration
University of Minnesota
Minneapolis, Minnesota

Below is presented a listing of Ph.D. dissertations conducted by students on topics related to Center research activities. Following that are selected examples of Educational Specialist and M.A. theses and B.A. Summa papers.

Ph.D. Dissertations

Archwamety, T. A mastery based experimental program for teaching mentally retarded children word recognition and reading comprehension skills through use of hypothesis/test procedures. Advisor: S. Jay Samuels.

Bender, N. The effects of verbal self instruction and strategy training on normal, impulsive and retarded children. Advisor: James E. Turnure.

Broen, P. The verbal environment of the language-learning child. Advisor: Gerald Siegel.

Cicchetti, D. The organization of development in Down's syndrome infants. Advisor: William Charlesworth.

Clark, C. A comparative study of young children's ease of learning words represented in the graphic systems of Rebus, Bliss, Carrier-Peak and Traditional Orthography. Advisor: Donald F. Moores.

Fithian, M. An investigation of the relationship between environmental process variables and achievement in young Down's syndrome children. Advisor: John E. Rynders.

Gutmann, A. J. The production of illustrative hand and arm gestures by mothers communicating with their children as related to sex and age of the children and task requirements. Advisor: James E. Turnure.

Heath, B. The application of behavior modification procedures to the classroom. Advisor: Byron R. Egeland.

Hoffmeister, R. H. The development of demonstrative pronouns, locatives, and personal pronouns in the acquisition of American Sign Language by deaf children of deaf parents. Advisor: Donald F. Moores.

Kennedy, A. The miniature linguistic system as a code-breaking device for the deaf. Advisor: Donald F. Moores.

Kreutzer, M. A. Help-seeking behavior in pre-school high-risk mentally retarded children. Advisor: William Charlesworth.

Krus, P. Use of family history data to predict intellectual and educational functioning from ages four to seven. Advisors: Frank H. Wood and Rosalyn Rubin.

Markwalder, W. Susceptibility of reasoning level to change: A study of cognitive stage transition. Advisor: James E. Turnure.

Mattick, P. Effects of three instructional conditions upon the exploratory behavior of retarded and normal infants. Advisors: Bruce Balow and John E. Rynders.

Riegel, R. H. The effects of organizational versus content training on the learning and retention abilities of young handicapped children. Advisor: Frank H. Wood.

Rondal, J. A. Maternal speech to normal and Down's syndrome children matched for mean length of utterance. Advisors: James E. Turnure and Donald F. Moores.

Terry, P. The effect of orthographic transformations on speed and accuracy of semantic categorization. Advisor: S. J. Samuels.

Wolf, J. The relationship of mother-child interaction and the later achievement of Down's syndrome children. Advisor: John E. Rynders.

Educational Specialist Paper

Parker, B. A reading curriculum for secondary deaf students. Advisor: Donald F. Moores.

Masters Theses

Baxter, S. Development of rebus vocabulary skills in Down's syndrome children. Advisor: John E. Rynders.

Baumtrog, C. The use of nonvocal symbol systems as a means of communication in autistic children. Advisor: Bruce Balow and Donald F. Moores.

Boyle, M. The use of auditory and visual discrimination and figure-ground tests to predict success in first grade reading taught by a phonic approach. Advisor: Elizabeth Gallistel.

Brandal, S. The reliability of the visual information processing test battery. Advisor: Byron R. Egeland.

Carter, G. A classification of words according to their phonic structure and grapheme-phoneme combinations. Advisor: Elizabeth Gallistel.

Clark, M. The relationship between visual processing skills and reading achievement: A validity study. Advisor: Byron R. Egeland.

Dell, V. Stimulating early reading behaviors in preschool Down's syndrome (mongoloid) children using the typewriter as a motivational tool. Advisor: John E. Rynders.

Elliott, M. B. Improvement in articulation with an aural model as a predictor of adequate articulation in second grade. Advisor: Mildred C. Templin.

Fischer, P. An investigation of verbal and nonverbal auditory discrimination learning by kindergarten children who were poor discriminators. Advisor: Elizabeth Gallistel.

Fisher, S. Vocational status of graduates of post-secondary vocational technical programs for the deaf. Advisor: Donald F. Moores.

Gifford, I. Use of visual and auditory aptitude tests to predict success in first grade reading taught by a phonic approach. Advisor: Elizabeth Gallistel.

Gray, V. K. A reanalysis of spatial reasoning in three ethnic groups comparing individual data to group data. Advisor: David H. Feldman.

Haymen, M. The relationship of visual and auditory aptitudes in the acquisition of beginning reading skills among low readers using whole word linguistic instruction. Advisor: Elizabeth Gallistel.

Hibbs, B. The relationship of visual and auditory aptitudes of the first grade low readers under sight word and phonic instruction. Advisor: Elizabeth Gallistel.

Horning, S. An auditory training program for preschool hearing impaired children. Advisor: Donald F. Moores.

Jones, N. A comparison of efficiency of three learning conditions employed on a simple problem solving task by severely retarded children. Advisor: John E. Rynders.

Kempf, K. Teaching a disabled child to recall. Advisor: Elizabeth Gallistel.

Kreibach, C. A comparison of American Sign Language and signing exact English. Advisor: Donald F. Moores.

Kreibach, C. Resource Room: An educational alternative for hearing impaired children. Advisor: Donald F. Moores.

Luedke, C. A. Modes of communication used by deaf students with various audiences. Advisor: Donald F. Moores.

Luedke, C. A. The ability of deaf students to determine speech intelligibility. Advisor: Donald F. Moores.

Luetke, B. Attitudes of parents of deaf Mexican American children towards educational services provided. Advisor: Donald F. Moores.

McCracken, C. The contribution of research in auditory and visual perception to the solution of early reading failure. Advisor: Elizabeth Gallistel.

Montgomery, M. Task orienting behavior of Down's syndrome (Mongoloid) and normal children in a condition of increasing stimulus intensity. Advisor: John E. Rynders.

Morgan, A. The process of imitation in early language development of deaf children of deaf parents. Advisor: Donald F. Moores.

Nelson, R. The effectiveness of Money Unit with TMR students. Advisor: Patricia H. Krus.

Odenyo, M. A comparison of short term memory in deaf and hearing elementary age students. Advisor: Donald F. Moores.

Satullo, M. Art as a means of promoting communication skills in preschool trainable mentally retarded children. Advisor: John E. Rynders.

Stephen, J. The teaching of manual communication as a second language to deaf students. Advisor: Donald F. Moores.

Taxis, W. The evaluation and educational significance of training to develop imagery and verbal elaboration. Advisor: Arthur M. Taylor.

Thurlow, M. L. Mental elaboration and the extension of mediational research: List length effects on verbal elaboration phenomena. Advisor: James E. Turnure.

Trautz, S. C. Effective use of elaboration strategies by transition class children and resulting educational implications. Advisor: Arthur M. Taylor.

Weiss, K. The comprehension of reversible passive structure by young deaf children. Advisor: Donald F. Moores.

Wolf, J. Measurement of receptive language ability in Down's syndrome (Mongoloid) children through the use of a visual-motor assessment device. Advisor: John E. Rynders.

Bachelor Summa Papers

Donnelly, L. Developmental trends on children's conceptual strategies for grouping and remembering. Advisors: R. Hunt Riegel and Robert Wozniak.

Nuechterlein, M. A verbal self-instruction curriculum for impulsive poor readers. Advisor: Robert Wozniak.

PERSONNEL

According to its records, the Center has employed more than 350 individuals since its inception in 1969. Faculty members have come from the Colleges of Education, Liberal Arts, and Medicine. Many of the Center's other employees were students at the time of employment, with almost one-third of employed students being majors in Special Education.

Faculty

	Period Employed
Anderson, Douglas	7/20/70-8/21/70
Balow, Bruce	6/23/69-12/31/70
Bart, William	9/16/70-9/15/74
Bruininks, Robert	7/21/69-3/31/72
Charlesworth, William	1/1/73-8/31/76
Egeland, Byron	7/1/72-8/31/76
Feldman, David	7/21/69-12/31/70
Gallistel, Elizabeth	9/1/70-8/23/72
Graves, Michael	7/21/75-8/20/75
Horrobin, Margaret	6/23/70-8/31/76
Martin, Richard	6/23/70-12/31/71
Moores, Donald	7/21/69-7/15/77
Rubin, Rosalyn	1/1/71-6/15/71
Rynders, John	9/8/69-8/31/76
Samuels, S. Jay	1/1/72-8/31/76
Siegel, Gerald	6/23/70-12/31/70
Templin, Mildred	7/1/71-12/31/74
Turnure, James	8/18/69-7/15/77
Wozniak, Robert	1/1/72-8/31/76

	Period Employed
Principal Secretaries	
James, Patricia	12/1/69-12/31/70
Thurlow, Audrey	9/1/70-7/15/77
Senior Secretaries	
Gehant, DeAnna	7/1/71-2/29/75
Administrative Officers	
Boeckman, Sylvester	11/16/69-3/31/74
Gorlin, Marilyn	7/1/74-8/31/76
Research Associates	
Best, Barbara	9/16/72-8/30/74
Clark, Charlotte	9/8/69-8/31/76
Ingham, Roger	7/1/71-11/15/71
Krus, Patricia	6/23/70-8/23/74
Riegel, R. Hunt	10/1/70-9/15/73
Roberts, Gail	9/16/73-12/31/74
Taylor, Arthur	9/16/70-2/15/74
Wasson, John	6/16/70-6/15/71
Woodcock, Richard	6/16/70-12/31/73
Research Fellows	
Bearman, Terry	7/1/71-9/15/71
Bloom, Jan	9/16/75-8/31/76
Broen, Patricia	9/16/69-9/15/71
Buium, Nissan	10/1/73-8/15/76
Chang, Clem	7/1/69-3/22/70
Chang, Pi-Nian	9/1/70-12/31/73
Curnow, Paul	12/1/69-3/22/70
Ellenberger, Ruth	8/22/74-8/31/76
Eyles, Karin	10/1/69-12/31/70
Fallenstein, Judith	1/1/73-3/31/73
Feldman, Diane	7/16/69-9/30/69
Fisher, Steven	10/1/72-12/15/74
Fithian, Marylee	9/1/70-3/31/73
Glaman, Trudy	9/16/72-3/31/73
Goodwin, Marilyn	9/16/72-8/31/76
Harlow, Mary Jane	9/16/72-4/30/75
Hegeman, Wm. Roger	3/16/74-8/31/76
Hoffmeister, Robert	9/16/71-6/25/76

Research Fellows - continued

	Period Employed
Jones, Nancy	9/16/69-8/31/72
Krus, David	10/1/73-8/30/74
Larsen, Sharon	10/16/69-7/15/71
Liu, David	9/1/72-3/31/74
Mattick, Pamela	9/16/69-3/22/70
McIntyre, Cynthia	10/1/70-8/31/72
Morishima, Akira	9/16/69-12/31/70
Ng, Tusn Ket	9/16/70-12/31/70
O'Brien, Marcia	2/9/73-3/31/73
Refsell, Judith	10/13/69-12/31/70
Robbins, Stephen	7/1/74-6/15/76
Seshadri, Lynn	1/1/75-12/31/75
Swanson, David	8/1/72-12/31/74
Thorn, William	3/2/70-12/31/70
Thurlow, Martha	1/5/70-7/15/77
Weiss, Karen	1/5/70-8/31/76
Whitely, Susan	10/1/70-3/31/72
Wolf, Judith	6/23/70-7/31/75
Zvi, Jennifer	6/23/70-3/31/72

Research Specialists

Doughty, Margaret	7/16/69-8/15/70
Fleming, Patricia	9/17/69-12/19/69
Schnoes, Esther	9/1/69-9/30/69

Account Clerks/Statistical Clerks

Barnard, Adrienne	1/15/72-3/31/72
Cross, Shirley	2/2/70-3/22/70

Artists/Key Punch Operators

Keprios, Nancy	1/1/72-3/31/72
Lind, Peggy	10/1/69-12/22/69
Mattson, Lynton	1/12/70-3/22/70

Clerk Typists/Clerks

Blank, Lillian	12/23/69-3/22/70
Hansen, Lila	9/14/70-12/31/70
New, Gretchen	6/23/70-9/15/70
Palvia, Pankai	9/11/72-9/30/72
Sullivan, Coral Ann	9/20/72-8/15/73
Wu, William	1/8/73-1/31/73

Junior Scientists/Lab Technicians/Assistant Scientists

	Period Employed
Ettema, Marsha	1/4/72-7/5/72
Howe, Roseshel	3/15/72-12/15/75
Kjergaard, Lana	1/1/73-8/31/76
Sommers, Ann	7/1/72-10/15/74
Wangness, Marlisa	10.1.71-8/23/74
Zakarison, Paula	2/2/70-3/22/70

Psychometric Assistants/Psychometrists

Adrian, Mary	8/1/72-3/22/74
Appleby, Patricia	10/10/72-12/31/72
Bergh, Anne	1/22/74-3/31/74
Binger, Kathleen	6/17/76-7/15/76
Broderick, Jamie	10/15/75-8/31/76
Daniels, Sheri	6/17/65-7/31/76
Eickhoff, Judith	8/20/72-12/31/72
Fisette, Susan	10/27/69-3/22/70
Francis, Janet	7/16/70
Hastie, Bruce	3/20/72-3/31/72
Kleinschrodt, Rochele	10/1/75-8/31/76
Lubansky, Richard	10/31/69-3/22/70
Macdonald, Arlene	10/16/73-12/31/73
Nyberg, Helen (Billing)	1/5/70-7/11/75
Ockuly, Thomas	7/1/72-3/31/73
Osborne, Richard	11/16/72-7/7/76
Savageau, Janet	3/1/74-2/7/75
Sonstegard, Nancy	1/23/75-8/15/75
Sprang, Dorothy	3/22/73-6/15/73
Troup, Joni (Blumenfeld)	3/15/72-8/31/75

Research Assistants (Graduate)

Appel, Frederick	3/30/70-8/31/70
Archwamety, Teara	1/1/72-3/31/73
Bauleke, Ann	7/1/73-12/31/73
Beckman, Beverly	10/1/72-3/31/73
Borlak, Judith	9/26/73-12/31/74
Bowers, Victoria	9/16/69-3/22/70
Buium, Candace (Caine)	11/10/75-1/31/76
Canter, Andrea	7/1/73-8/15/73
Clarren, Sandra	12/1/71-3/31/72
Donahue, Ruth	3/15/72-7/31/73
Donnelly, Linda (Johnson)	3/26/72-12/31/73
Erickson, Thomas	8/25/69-8/30/69
Fischer, Phyllis	10/1/70-3/31/73
French, Doran	9/16/73-3/31/74

Research Assistants (Graduate) - continued

	Period Employed
Gonzales, Barbara	1/1/72-3/31/72
Gray, V. Katherine	7/1/70-7/15/71
Greenberg, Robert	1/7/75-6/13/75
Grossman, Jean	3/15/72-3/31/72
Gudeman, Roxane	2/8/73-3/31/73
Gunkler, John	7/1/72-8/31/73
Hansen, Carolyn	11/1/72-12/31/74
Hanson, Bruce	8/15/70-12/31/70
Hartnett, Betty	9/16/69-3/22/70
Hauber, Florence	9/16/72-9/30/72
Heath, Barbara	10/1/73-3/31/74
Hibbs, Barbara	7/10/72-3/31/73
Holen, Margo	10/1/69-3/22/70
Hopmann, Marita	11/1/73-3/31/74
Johnson, Lee	7/15/69-9/30/71
Jones, Mirza	10/1/69-3/22/70
Kopstein, Diane	1/1/72-9/16/72
Kreutzer, Mary	7/1/73-8/31/73
Kuhl, Patricia	9/1/70-12/31/71
Laliberte, Jeanne	4/18/72-5/31/72
Lederberg, Amy	9/16/74-8/31/75
Lifson, Pamela	7/1/72-8/15/73
Liszt, Barbara	2/16/72-3/31/72
Mandernach, Jan	7/1/74-8/15/74
Marble, Kathleen	7/1/75-9/30/75
Markwalder, Winston	7/16/71-3/31/72
Marrinan, Burnae	9/16/70-12/31/70
McLain, Gail	7/15/73-7/30/73
Miller, Kathy	7/1/71-9/30/72
Milstein, JoEllen	3/17/72-3/31/74
Myers, John	9/23/69-3/31/72
Nelson, Kathleen	11/30/72-9/15/74
Niedorf, Vida	9/16/71-7/21/72
O'Malley, Patrick	5/7/75-8/31/76
Oxman, Karen	7/1/70-7/30/70
Palmer, Rebecca	7/21/75-8/20/75
Pitman, Mary Anne	9/29/75-8/31/76
Rondal, Jean	9/24/73-6/30/75
Schrimpf, Vicki	9/23/74-6/15/75
Stephen, Joan	7/1/73-9/30/73
Steyaert, Marcia	7/21/75-8/31/76
Steincamp, Lee	3/27/72-3/31/72
St. Sauver, Sylvia	3/22/72-3/31/72
Taxis, Henry	7/1/71-8/31/72
Terry, Pamela	9/16/74-8/31/75
Thibodeau, Anne	7/1/73-8/15/73

Research Assistants (Graduate) - continued

	Period Employed
Verant, Patricia	3/20/72-8/31/74
Vogt, Mary	1/19/72-3/31/74
Voldaht, Susan	10/25/72-12/31/72
Wahlin, Merry	7/1/71-8/31/72
Walsh, Kateri	9/1/69-9/16/69
Wangness, David	2/23/70-3/31/74
Wess, Bruce	10/16/75-6/30/76
Westermeyer, Rachel	1/1/72-8/31/72
Woods, Carol	10/1/70-12/31/70

Research Assistants (Undergraduate)

Anderson, Karrie	7/1/73-3/31/74
Arneson, Carole	1/19/72-6/15/72
Bakker, Steven	3/1/74-3/31/74
Ball, Crystal	10/7/74-8/31/76
Barrie, Lee	7/19/72-1/15/73
Bell, Jon	10/1/69-3/22/70
Benjamin, Ellen	7/1/72-3/31/74
Bie, Andrea	8/1/74-4/30/75
Bland, Patricia	7/1/73-10/31/75
Blecha, Mary Kay	8/13/73-3/31/74
Bothwell, Shirley	10.9.73-1/31/74
Bourdon, Janet	12/8/69-3/22/70
Bronson, Raymond	7/1/74-8/15/74
Carlson, Sharon	12/2/74-8/15/75
Carpenter, Camille	11/29/73-8/28/75
Carpenter, Robin	3/22/74-8/15/75
Cheney, Aloysius	4/24/73-6/15/73
Chong, Simon	9/19/73-8/31/76
Collias, Karen	6/16/75-8/31/75
Collins, Daniel	2/1/74-3/31/74
Cordell, Mary	10/18/73-6/25/75
Corson, Bonita	8/1/71-8/30/71
Danner, Ceborah (Duncan)	10/29/69-3/31/73
Danner, Fred	3/15/72-7/30/73
Determan, Debra	10/16/74-10/31/74
Dinneen, Michael	3/15/72-3/31/73
Dinya, Patrick	8/1/75-3/31/76
Drury, Jean	7/15/73-11/16/73
Dunnavan, Mary	3/31/72-4/30/72
Duntley, John	4/22/74-12/31/74
Evarts, Rick	8/7/72-3/31/73
Feldhake, Pamela	2/21/72-3/31/72
Foster, Sherrie	9/28/75-6/15/76
Frerichs, Craig	10/29/74-12/31/74
Friedman, Barbara	7/1/73-3/31/74

Research Assistants (Undergraduate) - continued

	Period Employed
Gale, Susan	1/28/74-3/31/74
Gilbert, Carol	9/1/73-3/31/74
Glennon, Susan	9/1/73-12/31/73
Greene, Cynthia	10/1/69-12/31/70
Grimer, D. James	7/15/69-9/14/69
Gritti, Janice	7/1/72-8/31/73
Halligan, Mary Sue	8/15/70-9/15/70
Hansen, Karen	8/1/73-12/31/74
Harris, Patricia	3/22/72-4/15/72
Heimer, Jacquelyn	3/15/72-3/31/72
Hodroff, Nan	1/1/74-2/15/74
Jambeck, Mary	1/26/72-3/31/73
Jesson, Lynn	9/1/73-3/31/74
Jewczyn, John	9/16/69-3/22/70
Johanson, Bickie	9/1/73-3/31/74
Johnson, Valerie	12/16/74-8/31/76
Juster, Joyce	3/20/72-3/31/73
Kaatrud, Jane	8/24/72- 2/31/73
Kemper, Constance	7/15/73-3/31/74
Kerkow, Janet	2/17/75-12/15/75
Kim, Chong-kook	10/21/74-11/1/74
Kjerland, Linda	3/20/72-12/31/72
Kliever, Barbara	6/24/70-8/15/70
Kopplow, Charlene	12/1/73-3/31/74
Larsen, Laurie	10/3/69-8/15/71
Lillie, Vivian	6/23/70-8/15/70
Mack, Ellen	7/1/72-9/30/72
Masoner, Judith	7/1/71-3/31/72
Mast, Terril	7/16/71-7/30/71
McCloughan, Robert	4/22/74-5/31/74
McGee, Mark	5/8/73-7/31/73
McIntosh, Margaret	9/6/72-12/31/72
Moor, Patricia	7/6/72-3/31/73
Mueller, Christine	10/23/72-8/23/84
Nuechterlain, Margaret	1/2/72-9/30/72
Nyquist, Wendy	7/1/72-3/31/73
Oberg, Linda (Norman)	7/1/74-8/31/76
Olander, John	9/15/73-12/31/74
Papatola, Dorothy	6/23/70-8/21/70
Pederson, Margit	10/1/73-3/31/74
Riquet, Candy	7/1/72-7/6/73
Ritchey, Linda	2/12/73-3/31/73
Ryan, Victoria	1/1/72-3/31/73
Schnoenecker, Lisa	1/28/74-3/31/74
Sevick, Delores	1/16/72-3/31/72
Sheppard, Sherry	9/29/72-7/31/73
Stark, Linda	9/1/73-3/31/74

Research Assistants (Undergraduate) - continued

	Period Employed
Stecker, Carol	2/15/74-3/31/74
Stoefen, Mary	3/20/72-8/15/72
Strike, Patricia	11/27/72-12/31/73
Tankenhoff, Marla	6/23/70-12/31/70
Thompson, Anna	9/16/70-12/31/70
Thomson, Judith	3/26/74-3/31/74
Voedisch, Margaret	12/16/69-1/5/70
Wales, Linda	9/29/69-3/22/70
Westbrook, Kathryn	10/1/73-12/31/73
Wilkinson, Alexander	9/27/72-7/30/73
Wirth, Christi	2/23/73-3/31/73
Zilberstein, Tova	7/1/72-12/31/72

Senior Clerk Typists

Belmas, Jane	10/27/75-8/31/76
Betterton, Margaret	7/1/71-9/30/71
Cobb, Virginia	3/9/70-3/22/70
Hilton, Suzanne	1/1/72-9/15/72
Johnson, Brenda	7/1/71-9/30/71
Lea, Virginia	9/27/72-3/31/74
Lindberg, Margitta	9/7/72-3/31/74
Mahon, Pat	4/12/74-6/15/74
Marchatte, Carolyn	7/16/69-9/22/69
Mattson, Cathy	11/19/73-6/15/76
Pugh, Karen (Fuechtmann)	8/25/72-9/30/75
Skinner, Marcia	8/27/75-9/5/75
Sorenson, Cheryl	9/14/72-3/31/73
Tarara, Stephanie	9/1/72-12/31/72
Tjoa, Jie Soen	6/7/74-6/30/74
Tshida, Nancy	8/12/74-5/30/75
Weseloh, Theresa	7/1/74-8/31/74

Senior Lab Technicians/Attendants/Trainees/Drivers

Behlen, Katherine	9/16/73-7/7/76
Bergman, Joanne	8/16/73-12/31/73
Bongaarts, Gail	10/1/69-12/31/70
Briggs, Paulette	12/23/69-3/22/70
Brooks, Marilyn	11/3/69-12/19/69
Bruce, Nan	4/23/71-5/30/71
Butterfield, Dorothy	11/3/69-12/22/69
Coe, Anthony	8/1/71-2/15/72
Conger, Judith	2/1/72-8/15/72
Delastrada, Robert	2/5/73-12/21/73
Drott, Mary	8/1/71-8/30/72
Eldredge, Clare	11/3/69-12/22/69

Senior Lab Technicians/Attendants/Trainees/Drivers - continued

	Period Employed
Fredeen, Suzanne	11/3/69-3/22/70
Gamble, Marilyn	11/3/69-12/22/69
Golob, Marsha	11/3/69-3/22/70
Greco, Jane	7/1/72-8/31/75
Hage, Jamie	7/24/74-7/16/75
Halbur, Patricia	11/3/69-12/31/70
Herrmann, Rbadu Sue	9/1/72-9/30/72
Hofstrand, Joanne	11/3/69-3/22/70
Johnson, Marlys	1/8/70-3/22/70
Kaiser, Luanne	1/8/70-12/31/70
Kaplan, Joanne	9/15/73-5/31/77
Kasma, Deborah	9/15/75-8/31/76
Kellgren, Jan	10/1/70-12/31/70
Kiste, Valerie	11/3/69-12/31/70
Kroskin, Marie	11/3/69-12/31/70
Landy, Dorothy	11/3/69-12/22/69
Lang, Kay	1/8/70-3/22/70
Lange, Susan	11/1/69-12/22/69
Lerman, Rita	11/3/69-12/22/69
Lindall, Martha	2/5/73-3/31/74
Lundquist, Barbara	4/14/72-6/15/72
Maland, Beth	1/4/74-5/15/74
Matter, Patricia	9/29/69-3/22/70
Mattson, Susan	10/23/72-3/31/73
McCracken, Mary	1/16/73-3/31/73
McIntosh, Susan	1/1/73-3/31/73
McKnight, Barbara	3/26/73-3/31/73
Peterson, Margaret	10/28/69-12/19/69
Schmidt, Leanne	11/3/69-3/22/70
Sellers, Barbara	10/1/69-12/22/69
Smith, William	2/4/72-8/31/72
Storm, Cheryl	10/3/69-12/22/69
Taylor, Shirley	5/4/71-5/31/71
Teter, Lawrence	11/3/69-3/22/70
Turner, Lois	10/1/69-3/22/70
Unze, Marsha	11/16/72-3/31/74
White, Carolyn	11/3/69-12/31/70

Speech Pathologists

Berndt, Lois	4/17/72-6/1/72
Goldberg, Ellen	5/2/72-8/12/72
Graber, Adele	4/17/72-6/1/72
Milstein, Leslie	4/21/72-5/15/72

Translators	Period Employed
Anderson, Vicki	2/6/72-8/31/76
Bloomfield, Laura	7/1/74-12/31/74
Drury, Patricia	7/1/74-8/31/74
Egbert, Shirley	1/7/75-8/31/75
Finke, Carol	11/10/75-8/31/76
Holte, Diane	7/1/73-6/30/75
Johnson, Joanne	7/5/72-8/15/74
Lindenberg, Nancy	7/1/74-8/15/74
Luetke, Barbara	7/1/74-9/30/74
McCune, Mary	7/1/74-8/15/74
Perlman, Eve	10/15/73-3/31/74
Rarus, Nancy	1/1/73-10/15/73
Vintinner, Irene	7/1/74-9/15/74
Warick, Dennis	1/16/73-3/31/73